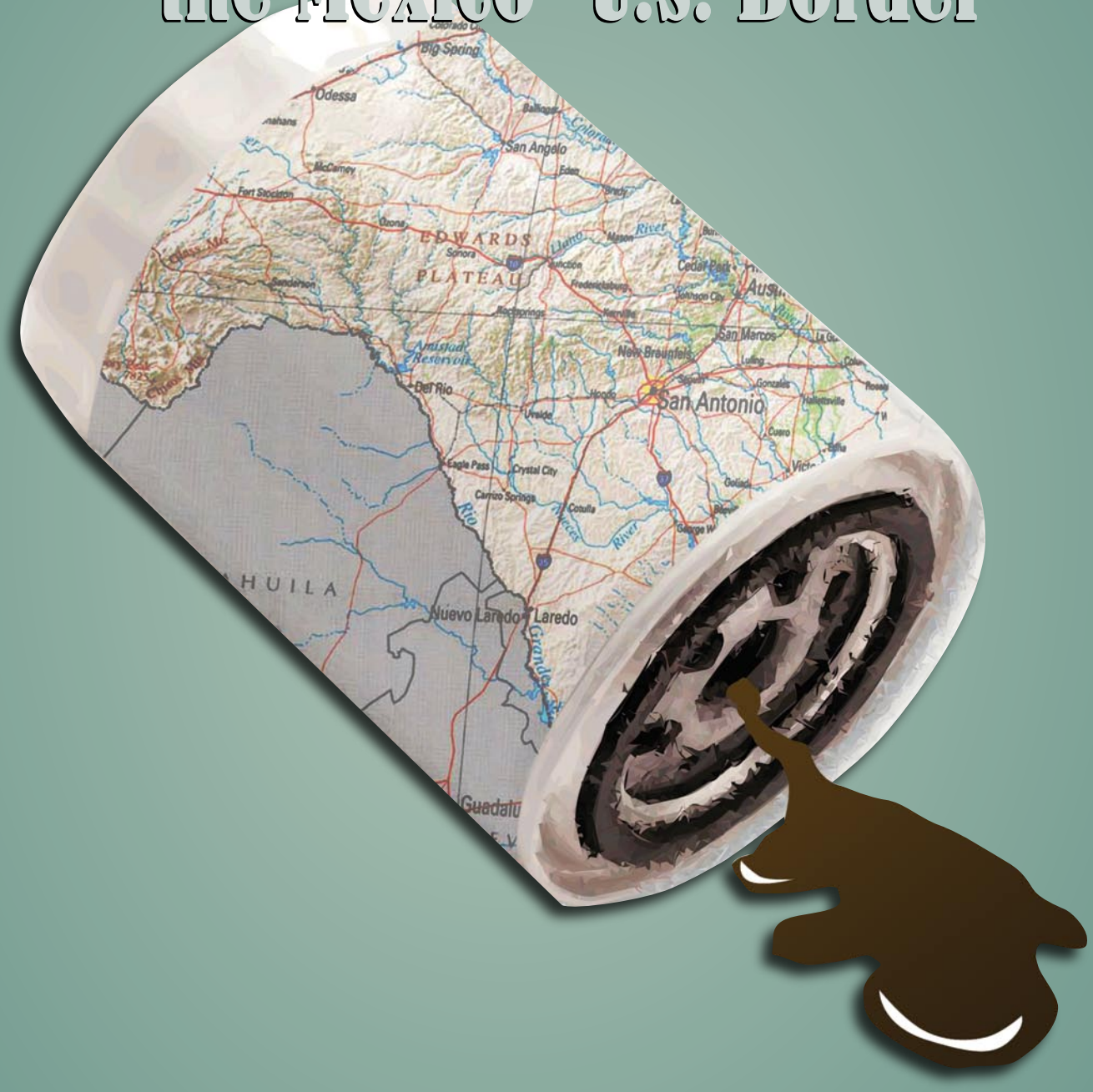
Managing Used Oil Along the Mexico–U.S. Border



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The University of Texas at Austin
Policy Research Project Report

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Managing Used Oil Along the Mexico-U.S. Border

Project directed by

David J. Eaton

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List of Acronyms

API	American Petroleum Institute
ADU	Atmospheric distillation unit
AOCA	Automotive Oil Change Association
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CHSC	California Health and Safety Code
CIWMB	California Integrated Waste Management Board
COA	Cédula de Operación Anual (Annual Operation Identification)
CONAP	Comisión Nacional de Áreas Naturales Protegidas
CPCC	California Public Contract Code
DEQ	Department of Environmental Quality
DOE	United States Department of Energy
DOT	United States Department of Transportation
DTSC	California Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
FTE	Full-time equivalent
GM	General Motors
LCRA	Lower Colorado River Authority
PCB	Polychlorinated biphenyl
PNA	Polynuclear aromatic
ppm	Parts per million
psi	Pounds per square inch

SEMARNAT	Secretaría del Medio Ambiente y Recursos Naturales (Secretary of Environment and Natural Resources)
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
U.S.	United States
UST	Underground storage tank
VDU	Vacuum distillation unit
VI	Viscosity index

Foreword

The Lyndon B. Johnson School of Public Affairs has established interdisciplinary research on policy problems as the core of its educational program. A major part of this program is the nine-month policy research project, in the course of which two or more faculty members from different disciplines direct the research of ten to thirty graduate students of diverse backgrounds on a policy issue of concern to a government or nonprofit agency. This "client orientation" brings the students face to face with administrators, legislators, and other officials active in the policy process and demonstrates that research in a policy environment demands special talents. It also illuminates the occasional difficulties of relating research findings to the world of political realities.

This report was completed as a part of a policy research projects focusing on cross-border environmental management during the 2005-2006 and 2006-2007 school years. Amanda Van Epps drafted most of this report, specifically Chapters 1-5 and 7-8. Leigh Otey drafted Chapter 6. Sonia Uribe drafted Chapter 10, which Alicia Williams revised. Biol. Alma Leticia Figueroa Jimenez, Samuel Lopez, and Denisse Varela-Olivas participated as partners in the research for Chapter 10. This research was supported by a grant from the Border 2012 program of the U.S. Environmental Protection Agency and financial contributions from the Bess Harris Jones Centennial Professorship in Natural Resource Policy Studies, the Institute for Innovation, Creativity, and Capital, the Kozmetsky Global Collaboratory at The University of Texas at Austin, and the Cross Border Institute for Research and Development at The University of Texas at Austin. Lori O'Neal and Paul Hobart copyedited the text and Professor David Eaton edited the report.

The curriculum of the LBJ School is intended not only to develop effective public servants but also to produce research that will enlighten and inform those already engaged in the policy process. The project that resulted in this report has helped to accomplish the first task; it is our hope that the report itself will contribute to the second.

Finally, it should be noted that neither the LBJ School nor The University of Texas at Austin necessarily endorses the views or findings of this report.

James Steinberg
Dean

Acknowledgments and Disclaimer

The Cross Border Environmental Management Class thanks the many people who were willing to share their time and expertise with us in the course of researching this report. Any errors in this report are those of the authors.

Many state government officials shared their expertise with the class. The class thanks the following people working at the Texas Commission on Environmental Quality: Mansoor Ahmed, Registration and Reporting Section; Diana Borja, Office of Border Affairs; Richard C. Carmichael, Ph.D., P.E., CIH, Municipal Solid Waste Permits Section; Jorge Castillo, Office of Border Affairs; Janet Cornelissens, Registration and Reporting Section; Elizabeth Granja, Registration and Reporting Section; Steve Niemeyer, Office of Border Affairs; Edward Moderow, Office of Border Affairs; Gina Posada, Office of Border Affairs; Ross Pumfrey, Office of Border Affairs; Rachel Krause, Office of Border Affairs; Tooran Khosh, Waste Permits Division; Caroline Wersterfer, Registration and Reporting Section; Wayne Lee, Municipal Solid Waste Permits Section; and Cheryl Untermeyer, Municipal Solid Waste Grants Program. Miguel Pavon at the Texas/Mexico Borderlands Information Center provided the class with maps of the border. Glenn Gallagher at the California Integrated Waste Management Board provided information on California's used oil recycling program. Sue Tracy at the California Department of Toxic Substances Control helped further the report.

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The class is thankful to Lucy Neighbors, Lori O'Neal, and Paul Hobart, LBJ School staff, who supported the development of this project and this report. Neither the LBJ School of Public Affairs, The University of Texas at Austin, the U.S. Environmental Protection Agency, nor any other institution endorse the findings of this report. The authors and editor of this report are responsible for any remaining errors or omissions.

Executive Summary

This report describes and assesses policies for management of used oil in both the U.S. and Mexico, with particular focus on the El Paso-Ciudad Juárez area. The report begins with an evaluation of Texas's used oil management system, from the relevant used oil legislation through the resultant data reporting system to used oil management practices. Texas is part of a United States (U.S.) federal system, so Texas' used oil management practices reflect legislation in both the U.S. and Texas. This report describes a comparable program in California to develop some comparative insight and includes data gathered from a survey of used oil programs in states around the country. Later chapters discuss the most favorable disposition for used oil, some of the challenges that exist for encouraging greater re-refining of used oil, and recommendations for accomplishing the objectives of state used oil programs. A final chapter outlines oil regulations at the Mexican federal, state, and municipal levels relevant for Ciudad Juárez and reports available used oil data collected by the Mexican federal government.

Used oil and gasoline represent two major potential sources of hydrocarbon pollution of water, soil, and air. Managing used oil is a challenge because oil must be collected and properly disposed of after its use. The most recent U.S. data, although a decade old, indicate that only about 69 percent of used oil that could be collected nationwide is recovered. Used oil that is improperly disposed of can persist in the environment and migrate to water where it could affect ecosystems or contaminate a drinking water supply. Best available estimates indicate that hundreds of millions of gallons of used oil in both U.S. and Mexico may be disposed of improperly and pose a threat to human health and environmental quality.

Although used oil has the potential to cause environmental damage, once collected it can be burned as fuel or even recycled, cleaned of its impurities, and regenerated as lubricating oil or other petroleum products, saving oil, energy, and money. These options ensure that used oil has not been illegally disposed of and will not pose further risk to the water supply. Used oil also replaces the consumption of other valuable natural resources as fuels or base oils. Currently, more than 85 percent of used oil collected and recycled is subsequently used as fuel. The payments available from those who burn used oil as fuel can provide an incentive for generators to ensure proper collection and transport to the end users. Technically, both means of recycling and re-using used oil are feasible.

In the U.S., federal and state governments regulate the handling of used oil to limit its environmental impact. Once used oil has been generated, its handling is regulated until it reaches one of six ends: processing or re-refining; burning; reuse; or disposal as a solid waste, hazardous waste, or a waste containing polychlorinated biphenyls. Federal regulations (Code of Federal Regulations, title 40, part 279) establish standards for used oil generators, collection centers and aggregation points, transporters and transfer facilities, processors and re-refiners, burners of off-specification used oil, and used oil marketers. The regulations include guidelines for the handling and management of used

oil, including appropriate containers for storage of used oil, used oil handlers' required responses to any release of used oil, and recordkeeping requirements. The regulations also establish two means for a state environmental agency to track the used oil handling activities: required registration for each business (other than those that are only generators), and regular data reporting by used oil processors and re-refiners.

Texas has established regulations found in the Texas Administrative Code, title 30, part 1, chapter 324 (for used oil) and title 20, part 1, chapter 328, subchapter D (for used oil filters) in addition to the federal used oil standards. The Texas used oil standards incorporate all of the federal used oil regulations and provide clarification in some instances. State regulations specify how the registration and reporting requirements of the federal regulations can be fulfilled and expand the registration and reporting requirement for used oil collection centers. The Texas used oil standards outlaw the disposal of used oil in a landfill and identify other relevant state regulations that must be followed in particular situations, such as when used oil is stored in underground storage tanks or when used oil is spilled. The regulations also establish standards for the handling of used oil filters, which are not addressed specifically in the federal regulations.

Federal and Texas used oil regulations require entities that collect, transport, process, re-refine, burn or market used oil to register with the Texas Commission on Environmental Quality (TCEQ). Only used oil collection centers and used oil processors must submit reports regularly on the volume of used oil that they handle during the year. Other industry participants are not required to submit data to TCEQ or the U.S. Environmental Protection Agency. Texas law also requires automotive oil manufacturers and distributors to pay a fee of $0.04 per gallon on the first sale of oil in the state, which is to be used to administer the used oil recycling program in the state. The existing registration and reporting system in Texas complies with federal used oil standards; however, the data produced by the system does not allow for complete understanding of the fate of used oil. For example, in El Paso County, only certain entities within the used oil industry must provide data on their activities.

The State of California has a more comprehensive used oil program than Texas, and there are elements of the California program that may be useful for Texas to consider. The California used oil management standards found in the California Health and Safety Code and title 22 of the California Code of Regulations are intended to supplement and clarify the federal used oil standards. The California regulations require that used oil generators and collection centers comply with state requirements for hazardous waste generators, a more stringent requirement than those found in the federal regulations. Regulations outlaw the disposal of used oil in a landfill, as is also true in Texas, and the burning of used oil, which is permitted in Texas.

Title 14 of the California Code of Regulations established a "Used Oil Recycling Program" within the California Integrated Waste Management Board to encourage collection and recycling of used oil. California manages a recycling incentive fee system (16 cents per gallon) that collects money from oil manufacturers for every gallon of

virgin oil manufactured, and then pays out more than $3 million annually ($0.16 per gallon) to used oil collection centers, curbside collection programs, and industrial generators when they deliver their used oil to a recycling facility as an incentive to encourage collection and recycling of their used oil. California also provides grants to more than 250 local and regional programs that encourage greater collection of household used oil and used oil filters.

All used oil handlers including used oil generators are required to register with the California Department of Toxic Substances Control. The recycling incentive fee system has substantial reporting requirements; among them, used oil manufacturers report quarterly to the California Integrated Waste Management Board (CIWMB) on the volume of virgin oil manufactured and sold in the state, and used oil transporters and processors/re-refiners report to the CIWMB the volume of used oil taken to recycling facilities quarterly. These data allow the CIWMB to estimate that 80 to 100 percent of the used oil that remains after use is being collected and recycled in California. However, recent estimates indicate that only 12 percent of used oil collected in California is re-refined in spite of all of these efforts. The majority of used oil is blended and sold for use as a fuel outside of the state or distilled for use as marine diesel oil fuel.

Project staff conducted a survey of other U.S. state programs to understand how other states address used oil collection, monitoring, recycling and re-refining. Of the 15 states that replied to a survey, 11 reported used oil management programs and four did not. Due to the differences in geography, demographics, economics, and regulations these programs take a wide variety of forms.

The most important factors in the development of a state administered used oil program appear to be adequate funding and available staff. Efforts to collect used oil appear to be increasing in scope only in the states with established sources of revenue that support a used oil program. Most states indicated that they operated programs to encourage the recycling of used oil but it seems that little is being done to encourage reuse. While responses indicate that some programs are growing, many appear to be maintaining similar operations or are actually decreasing in scope. While the responses gathered do not indicate why a program would shrink, it shows that used oil management does not register as a priority within some states. That said, waste oil is a cash crop; its collection is increasing because of the high price of crude oil. State programs can only operate successfully within space created by the market.

Lubricating oil can include a broad range of finished petroleum products, including transmission fluids and other automotive oils as well as hydraulic oils, gear oils, and metal working fluids and other industrial use oils, in addition to motor oil used in automobile engines. Used oils are a mixture of a number of different constituents, among them base oils, additives, and impurities. Used oil processing and re-refining have been designed to separate out the desirable components of used oil from the undesirable residuals. However, the intended products of each of these treatment processes are very different. Used oil processing produces fuel oil that can be used in a number of ways, typically either as fuel in industrial furnaces or in marine diesel engines. Re-refining is a

more severe process that generates base oils, comparable to those that are produced by refining of crude oil that can be blended with other base oils and with additives to produce lubricating oil.

Several recent studies have compared the combustion of used oil with re-refining to determine if one is preferable on the basis of energy recovery, potential environmental impacts, or economic factors. One U.S. Department of Energy (DOE) study found that the re-refining process saved 8.1 percent more energy than burning of used oil, which could result in savings of $63 to $332 million if all used oil in the U.S. were re-refined instead of burned. Studies of the environmental impacts of used oil have also found re-refining to be the generally preferable method for reuse or recycling of used oil. However, less than 15 percent of used oil that is collected nationwide is currently re-refined to allow for further use. There is concern in the industry that re-refiners have attempted to influence legislation that would allow market forces to increase this percentage.

One economic estimate indicates that the re-refining of used oil and sale of the product could generate a loss as large as $0.50 or a profit as large as $0.70 per gallon, depending on the cost of crude oil. Other factors affecting the profitability of re-refining or re-use include the stringency of state and local regulations for the handling of used oil, the distance over which both the feedstock and finished products must be transported, and the size of the facility. Other challenges to the success of a re-refining facility include the large capital investment required, the ability to secure steady used oil feedstock and buyers for the re-refined product, and the rigorous permitting process.

Only two re-refining facilities currently operate in the United States, one facility operated by Evergreen Oil in Newark, California and a second operated by Safety-Kleen in East Chicago, Indiana. PetroTex Hydrocarbons plans to open a new re-refinery in Texas in 2008; the owners expect that the facility will re-refine 23 million gallons of used oil annually. The promise of elevated and increasing crude oil prices in the coming years offers hope that these facilities and new ones will remain profitable operations.

Two primary objectives have been identified for a state used oil program: the proper collection of as much used oil as possible and the increased diversion of collected used oil to re-refining facilities. The State of Texas should consider taking action to achieve these objectives. Texas should:

- use proceeds from U.S. Used Oil Recycling Account to provide small grants to municipalities to support local used oil collection and public education programs, including those that encourage collection of and education about used oil filters and motor oil bottles;

- adopt state- or county-wide procurement policies requiring that used oil generated by government agencies be diverted to re-refining and that government entities purchase re-refined motor oil, when possible;

- standardize the registration and reporting system for used oil processors/re-refiners, burners of off-specification used oil, and used oil fuel marketers to allow tracking of used oil recycling; and

- create more efficient registration and reporting requirement for used oil collection centers to minimize the burden on this important component of used oil collection from the public.

A similar evaluation of relevant regulations and data collection mechanisms was carried out for Ciudad Juárez in Mexico. In Mexico, used oil is categorized as a hazardous waste by the General Law for the Prevention and Integrated Management of Waste. This law and the General Law of Ecological Balance and Environmental Protection regulate the use, collection, storage, transport, re-use, recycling, treatment, and final disposition of hazardous waste. The laws also seek to assess and manage hazardous waste to prevent the release of this waste or to remediate contamination caused by a release. The Secretary of Environment and Natural Resources (Secretaría del Medio Ambiente y Recursos Naturales or SEMARNAT) is the Mexican government agency responsible for regulating used oil at the federal level. Hazardous waste generators must comply with specific regulations that vary depending on the size of the generators. Regulations are also provided for the storage and disposal of hazardous waste.

A Mexican state may authorize and manage hazardous waste generated or handled by micro-generators, and it may also impose penalties established in accordance with federal, state and municipal laws, as long as a corresponding agreement exists between the state and SEMARNAT. In addition, a state may create a registry system for hazardous waste collection, storage, transport, treatment, and final disposition. The municipalities are expected to coordinate the installation of equipment that will control contaminant emissions. The Law of Ecological Balance and Environmental Protection of the State of Chihuahua outlines objectives to increase social participation in the reduction, collection, reuse, treatment, and management of hazardous waste.

Limited data are available on the generation, handling and disposal of used oil in Cd. Juárez, Chihuahua. SEMARNAT does collect information on companies authorized to reuse, incinerate, or recycle used oil in Mexico, including the volume of used oil handled by these companies. With so few companies authorized to store hazardous waste, it appears that Mexico lacks infrastructure for recycling, treatment, and final disposal of hazardous waste. Therefore, it is believed that disposal of used oil is the most common final disposition for used oil.

With the limited data available, it is difficult to assess how effective these regulations have been and what the ultimate fate of Mexico's used oil may be. As with state programs in the U.S., it is reasonable that Mexican used oil Managers should encourage increased collection of used oil (to avoid its improper disposal) and greater recycling and reuse of used oil. Mexico would do better to change its classification of oil out of the harzardous waste grouping. Data collection could provide insight into the implementation of these regulations and allow for future policy changes in the interest of increase proper collection of used oil and encouraging used oil recycling. Furthermore, public education

could bring an awareness to the problem of improper disposal of used oil and its environmental consequences.

This survey of state used oil programs provides evidence that any expectations that used oil be recycled or re-used is not shared widely among all states. As a practical matter, the technology to burn or re-refine used oil is not complex, so there is no reason why much of the used oil in the U.S. could not be re-used rather than disposed. The next chapter describes some of the processes for the re-use of oil.

Chapter 1. Introduction

The purpose of this document is to evaluate relevant used oil legislation and the resultant data-reporting system in the U.S. and Mexico and recommend ways to improve the system, with particular focus on the City of El Paso, Texas, and the Municipio of Ciudad Juárez, Chihuahua. Because more information describing the situation in the U.S. was obtained, particular focus is paid to the situation as it exists in Texas. This task is accomplished by describing the relevant federal and state legislation along with the existing data-gathering mechanisms in Texas. For comparison purposes, the state program in California is addressed in detail accompanied by the results of a survey undertaken of other states' used oil programs. This report also describes engineering options available for recycling used oil and preparing it for reuse and discusses the most favorable disposition for used oil. Some of the challenges that exist for encouraging greater re-refining of used oil are discussed, and recommendations for accomplishing the objectives of state used oil programs in Texas are offered. A similar evaluation is provided for Mexico, including a summary of relevant federal, state, and local legislation, the used oil data that is gathered by regulatory agencies in Mexico, and policy options for increasing collection and reuse of used oil.

Used oil in cities and towns along the Mexican-U.S. border is an international issue that affects both countries and will continue to be a persistent concern. Both Mexico and the U.S. have identified used oil as a priority environmental issue under the U.S.-Mexico Border 2012 Program, which is inspired by Article 5 of the Agreement Between the United States of America and the United Mexican States on Cooperation for the Protection and Improvement of the Environment in the Border Area, also known as the La Paz Agreement. Table 1.1 contains language from the Border 2012 Framework Document[1] and the Summary of Accomplishments from the U.S.-Mexico Border 2012 Program: 2005 National Coordinators Meeting[2] addressing Goal #3 of the U.S.-Mexico Border 2012 Program, to reduce land contamination.

Used lubricating oil originates as a broad range of finished petroleum products, including transmission fluids and other automotive oils as well as hydraulic oils, gear oils, electrical transmitting equipment, and metal working fluids and other industrial use oils, in addition to motor oil used in automobile engines.[3,4] Unlike gasoline or other petroleum products, used lubricating oil has two important environmental implications that do not affect gasoline. First, after use, oil must be collected and properly disposed of. The most recent nationwide data in the U.S., although a decade old, indicate that only about 69 percent of used oil that could be collected nationwide is recovered.[5] Used oil that is not properly disposed can persist in the environment and migrate to water where it could affect ecosystems or contaminate a drinking water supply.[6] These estimates indicate that, in the U.S. alone, hundreds of million gallons of used oil may be disposed of improperly and pose a threat to waterways nationwide.[7] Given their size and lubricating oil consumption, many waterways in both Texas and Mexico likely receive oil discharges each year.

Table 1.1
Border 2012 Program Language

Border 2012 Framework
Objective 1: By 2004, identify needs and develop an action plan to improve institutional and infrastructure capacity for waste management and pollution prevention as they pertain to hazardous and solid waste and toxic substances along the U.S.-Mexico border.
Objective 2: By 2004, evaluate the hazardous waste tracking systems in the United States and Mexico. During the year 2006, develop and consolidate the link between both tracking systems.
Summary of Accomplishments from the U.S.-Mexico Border 2012 Program: 2005 National Coordinators Meeting
Completed a tracking evaluation report to comply with Objective 2 on hazardous waste trans-boundary tracking under Goal 3 on reducing land contamination. SEMARNAT initiated SIRREP Plus, an information system which will greatly improve hazardous waste tracking on the Mexican side. The U.S. EPA issued a new tracking manifest regulation which includes provisions to improve trans-boundary tracking.
Established key capacity building priorities in a Bi-National Action Plan on waste management and prevention technical assistance to comply with Objective 1 on capacity building under Goal 3. The Waste Policy Forum, the four regional Waste Task Forces and the public identified the following four capacity building priorities: tire pile prevention; placing more hazardous waste management facilities in Mexico; specific initiatives to address key waste streams and cross border tracking improvements; and improving solid waste management and recycling.
Initiated a used oil recycling project in Nogales, Sonora which includes improving collection and recycling of used oil from small auto repair shops and the updating of a database of approximately 200 small businesses that generate used oil.

Sources: U.S. Environmental Protection Agency (EPA) - Secretaria del Medio Ambiente y Recursos Naturales (SEMARNAT), *Summary of Accomplishments, U.S.-Mexico Border 2012 Program: 2005 National Coordinators Meeting,* March 8-10, 2005; and U.S. EPA – SEMARNAT, *Border 2012: U.S.-Mexico Environmental Program,* April 4, 2003.

Used oil has the potential to cause environmental damage; however, its useful life does not end once it has been replaced. Used oil can be burned as fuel after minimal treatment, or used oil can be separated into its components, cleaned of its impurities, and regenerated as lubricating oil or other petroleum products with more thorough treatment, saving oil, energy, and money. When used oil is burned or re-refined, by definition it will not be illegally disposed and will not pose further risk to the water supply. Re-use of oil also avoids the consumption of other valuable natural resources such as fuels or base oils.[8] Furthermore, the payment available from those who burn used oil as fuel can provide an incentive for generators to ensure its proper collection and transport to the end users.[9,10] Technically, both means of recycling and re-using used oil are feasible. The most recent estimates indicate that used oil has proven a cost-effective source of additional fuel in the U.S.,[11] with more than 85 percent of used oil that is collected and recycled in some fashion subsequently used as fuel.[12] The next chapter describes the basis of used oil regulation in the U.S., the federal regulations, which seek to encourage the proper disposal or re-use of oil.

Notes

[1] United Status Environmental Protection Agency (EPA) - Secretaria del Medio Ambiente y Recursos Naturales (SEMARNAT), *Border 2012: US-Mexico Environmental Program,* April 4, 2003.

[2] EPA – SEMARNAT, *Summary of Accomplishments, US-Mexico Border 2012 Program: 2005 National Coordinators Meeting,* March 8-10, 2005.

[3] Ibid.

[4] Jean-Pierre Wauquier, ed., *Crude Oil, Petroleum Products, Process Flowsheets,* Petroleum Refining, vol. 1 (Paris: Éditions Technip, 1995), p. 275.

[5] DOE, *Used Oil Study*, p. 5-1.

[6] United States Environmental Protection Agency (EPA) Office of Solid Waste RCRA Information Center, *Collecting Used Oil for Recycling/Reuse: Tips for Consumers Who Change their Own Motor Oil and Used Filters*, Washington, D.C., March 1994. Online. Available: http://www.epa.gov/epaoswer/non-hw/recycle/recy-oil.pdf. Accessed: December 14, 2005.

[7] DOE, *Used Oil Study*, p. 5-1.

[8] Ibid., p. 7-1.

[9] Bob Boughton and Arpad Horvath, "Environmental Assessment of Used Oil Management Methods," Environmental Science and Technology, vol. 38, no. 2 (2004), p. 353.

[10] Scott Parker, Executive Director, NORA, "Developing Markets for Used Oil" (presented at a conference on "Cross-Border Environmental Management," at the University of Texas at Austin, March 2007).

[11] DOE, *Used Oil Study*, p. 4-4.

[12] Ibid., p. 5-1.

Chapter 2. Federal Used Oil Regulations

Concern over American dependence on oil has heightened recently with most of the focus on consumption of gasoline in cars; however, the extensive use of automobiles requires other petroleum products as well, including engine lubricating oil. More than 24 percent of all lubricating oil sold worldwide is consumed in the United States (U.S.),[1] and about 60 percent of the lubricating oil sold in the U.S. is for use in cars.[2]

Used oil management standards have been in place for more than 15 years at the federal level, but the environmental implications of used oil resurfaced in the Energy Policy Act of 2005. The act required the U.S. Department of Energy (DOE) and U.S. Environmental Protection Agency (EPA) to collaborate on:

> A study of the energy and environmental benefits of the re-refining of used lubricating oil and report to Congress within 90 days after enactment of this Act including recommendations of specific steps that can be taken to improve collections of used lubricating oil and increase re-refining and other beneficial re-use of such oil.[3]

The inclusion of a used oil study in this piece of legislation indicates the potential for cost and energy savings if all used oil were recycled beneficially, as well as the large gap between what is possible and what is currently practiced.

Efforts to regulate both the handling and eventual disposal of used oil at the federal level date back to the 1970s. The United States Environmental Protection Agency (EPA) established standards for hazardous wastes and considered including used oil among wastes deemed hazardous. A final decision on used oil was not made until 1992 when EPA decided that "used oil" would not be classified as a hazardous waste.[4] Instead, EPA created used oil management standards to manage the threat that used oil could pose to the environment without "discourag[ing] used oil recycling," as required by the section of the Resource Conservation and Recovery Act that required regulation of used oil.[5]

The federal government regulates used oil in the United States through the Code of Federal Regulations (CFR), title 40, part 279, entitled "Standards for the Management of Used Oil" (federal used oil standards).[6] The federal used oil standards consist of nine subparts, three of which are relevant to all used oil handling activities. The remaining six parts describe requirements that apply only to one used oil handler category, either: generators; collection centers and aggregation points; transporters and transfer facilities; processors and re-refiners; burners who burn off-specification used oil for energy recovery; or fuel marketers. This chapter describes the content of each of these nine subparts.

The standards require that each business entity follow rules that are specific to their category. Any business engaged in more than one of these activities must comply with all relevant regulations. The regulations include guidelines for the handling and

management of used oil, including appropriate containers for storage of used oil, used oil handlers' required responses to any release of used oil, and recordkeeping requirements. The regulations also establish two means for a state environmental agency to track the used oil handling activities: required registration for each business (other than those that are only generators), and regular data reporting by used oil processors and re-refiners.

Subpart A of the federal used oil standards defines 20 different terms used throughout part 279.[7,8] Seven key definitions (see Table 2.1) are those of "used oil" and each of the six used oil handler categories related to specific federal used oil regulations. One conception of the regulated used oil lifecycle is illustrated in Figure 2.1. The handling of used oil is regulated from its generation until it reaches one of six ends: processing or re-refining; burning; reuse; or disposal as a solid waste, hazardous waste, or a waste containing polychlorinated biphenyls (PCBs).

Used oil may be processed or re-refined subject to federal used oil standards. Used oil may be treated by a processor to produce fuel oil that can be used in a number of ways, typically either as fuel in industrial furnaces or in marine diesel engines.[9] Re-refining on the other hand generates base oils that are comparable to those that are produced by refining of crude oil, that can be blended with one another and with additives to produce lubricating oil.[10,11] Used oil that has been re-refined to produce these base oils is no longer regulated as used oil. Burning of used oil is also not subject to regulation under federal used oil standards if it is "on-specification" (below maximum concentrations of arsenic, cadmium, chromium, lead, and total halogens and meets the required minimum flash point.[12] However, the burning of off-specification oil as fuel is subject to federal used oil standards.

Used oil that is found to be a hazardous waste is subject to the regulations for management and disposal of hazardous waste outlined in the CFR, title 40, parts 260 through 265[13] instead of the federal used oil standards. There are two categories of hazardous wastes under federal waste regulations: listed and characteristic hazardous wastes. Listed hazardous wastes are specific compounds or categories of wastes (as identified in the CFR, title 40, part 261, subpart D).[14] Characteristic hazardous wastes are those that are not listed in the regulations as hazardous, but are determined to be hazardous because they are sufficiently ignitable, corrosive, reactive, or toxic.[15] Used oil that is mixed with a "listed" hazardous waste is automatically considered a hazardous waste. Used oil that is mixed with a characteristic hazardous waste must be evaluated for the ignitability, corrosivity, reactivity, or toxicity of the mixture. If the mixture is found to have one or more of these characteristics, then the mixture is considered a hazardous waste.[16]

Used oil that is found to have a total halogen concentration greater than 1,000 parts per million (ppm), or one part per thousand, is "presumed" to have been mixed with a halogenated hazardous waste according to the so-called "rebuttable presumption." The used oil then is considered hazardous unless analytical data or other information can establish that the halogen content of the used oil is not associated with halogenated hazardous waste.[17] Used oil that contains more than 50 ppm of PCBs is subject to the

PCB regulations in the CFR, title 40, part 761 instead of the federal used oil standards.[18] Even if the concentration of PCBs is reduced below 50 ppm by dilution, the used oil remains a PCB waste.[19]

Table 2.1
Federal Used Oil Standards Definitions

Term	Definition
Used oil	Oil, either synthetic or derived from crude oil, that has been contaminated through its use.
Used oil generator	A business or facility that uses synthetic or refined oil in the course of operations producing used oil.
Used oil collection center	Facility that collects used oil from more than one used oil generator and household do-it-yourselfers.
Used oil aggregation point	Facility where a generator may collect its own used oil generated at several locations that it owns or operates. May also collect used oil from household do-it-yourselfers.
Used oil transporter	A business that delivers used oil from one point to another or that operates a used oil transfer facility.
Used oil transfer facility	A facility where used oil that is being transported is stored for longer than 24 hours.
Used oil processing	A method for treating used oil either chemically or physically to make it able to be reused.
Used oil burner	A facility that takes used oil that contains high levels of contaminants (off-specification used oil) and burns the oil for energy.
Used oil fuel marketer	A business that either sends off-specification used oil to a used oil burner or determines that the oil is not off-specification.
Household "do-it-yourselfer" used oil generator	A person who generates used oil in servicing his own cars or other household items.
Do-it-yourselfer used oil collection center	A used oil collection center that only collects oil from household do-it-yourselfer used oil generators and not from other businesses.

Adapted from: Code of Federal Regulations (CFR), title 40, part 279, subpart A. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

Used oil that does not contain PCBs or other residuals that render it hazardous may be disposed of as a solid waste according to solid waste management standards instead of the federal used oil standards.[20]

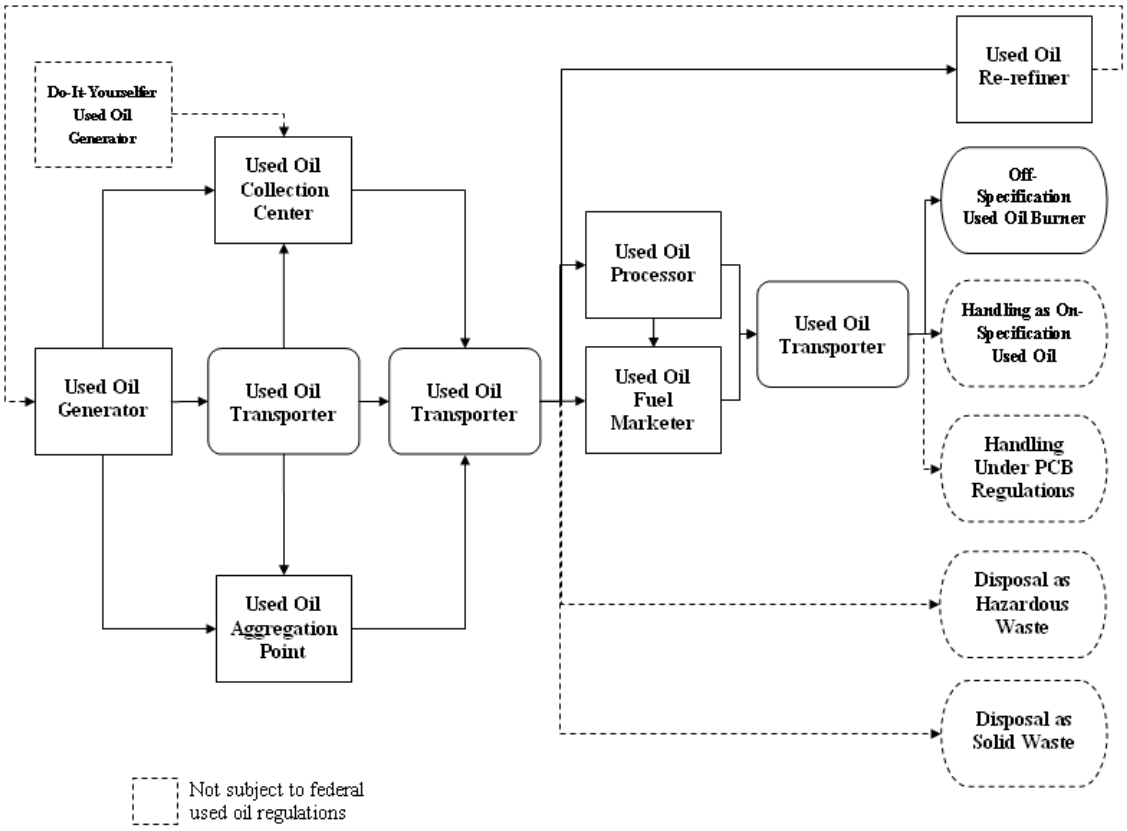
Those segments of the used oil lifecycle that are not regulated under federal used oil standards are shown on Figure 2.1 with dashed lines. As shown on the figure, household used oil is not regulated by federal used oil standards until it reaches a collection center, used oil transporter, or other regulated used oil handler.

Many used oil handlers are involved in more than one aspect of the used oil lifecycle. In such a case, the handler must comply with each set of regulations relevant to the operations. For example, any used oil transporter that also generates used oil must

comply with the regulations for used oil generators in Subpart C[21] as well as the regulations for used oil transporters in Subpart E.[22]

The federal used oil standards establish two other general prohibitions for used oil. Used oil may not be "managed in surface impoundments or waste piles" unless these "lagoons" or waste piles are themselves being managed as hazardous waste facilities.[23] Used oil may not be used as a dust suppressant.[24]

Figure 2.1
Regulated Lifecycle of Used Oil



Adapted from: CFR, title 40, part 279. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

Federal Used Oil Standards

Each participant in the used oil lifecycle (see Figure 2.1) is subject to different federal regulations. These regulations are discussed below.

Standards for Used Oil Generators

The category of used oil generators, as defined in Subpart A, includes any entity that generates used oil through its own operation.[25] Specific regulations governing used oil handling by generators are listed in Table 2.2.

Table 2.2
Federal Standards for Used Oil Generators

Category	Requirements
Used oil storage	• Must be stored in a tank or container intended for storage purposes or in a unit sufficient for hazardous waste storage. • Storage unit must be maintained in good condition and not allowed to leak. Storage unit must be labeled with the words "Used Oil."
Generator response to release of used oil to the environment	• Must take action to prevent further release of used oil. • Must clean up what has been released. • Must manage the used oil that is recovered according to these regulations. • If a leaking storage unit caused the release, the unit must be fixed or replaced.
On-site burning in space heaters	Allowed to burn own used oil or used oil that is collected from household do-it-yourselfer used oil generators in certain space heaters.
Off-site shipment of used oil	Must use a transporter with an EPA identification number to ship used oil off-site. Exceptions made if the generator: • transports 55 gallons or less of their own used to either a used oil collection center or a used oil aggregation point; • transports 55 gallons or less of used oil collected from household do-it-yourselfers to a used oil collection center; or • has a tolling arrangement with a used oil processor/re-refiner, under which the used oil is returned to the generator after processing, and the processor transports the used oil between the generator's facility and his own.
Notification	None
Reporting	None
Recordkeeping	None

Adapted from: CFR, title 40, part 279, subpart C. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

The federal used oil standards specifically exclude from regulation individuals who generate used oil, sometimes called household "do-it-yourselfer" generators or household generators.[26] In addition, oil that has been used at sea is not considered generated until it comes ashore. As a result, the owner(s) or operators of a ship and the entity receiving the used oil from a ship are considered used oil co-generators.[27] If a generator mixes used oil with diesel fuel for use in her/his own vehicle, then the mixture is no longer subject to the

federal used oil standards.[28] Farmers who generate 25 gallons of used oil or less from farm equipment in a year are also given an exemption.[29]

Used oil generators may perform limited used oil processing without being considered a processor or complying with the used oil regulations for used oil processors or waste oil re-refiners.[30] For example, a generator may recondition used oil for their own reuse, separate used oil from wastewater, use oil mist collectors, or they may drain used oil from containers.[31] Used oil generators are permitted to burn their own used oil on-site in space heaters without being considered a used oil burner, as long as the energy produced is less than 500,000 British thermal units per burner per hour.[32] Space heaters with no pollution control devices may negatively impact air quality, but this topic is beyond the scope of the report.

Standards for Used Oil Collection Centers and Aggregation Points

Centers that collect used oil only from household generators and used oil aggregation points must comply only with the used oil generator standards in subpart C.[33,34] Used oil collection centers that accept used oil from commercial or industrial generators must also register with the state or local government.[35] In Texas, such a collection center would register with the Texas Commission on Environmental Quality (TCEQ).

Standards for Used Oil Transporters and Transfer Facilities

The federal used oil standards apply to any used oil transporter, with the exceptions indicated below. Specific regulations governing used oil handling by transporters and transfer facilities are listed in Table 2.3. Transport of used oil within the facility at which it was generated is exempt from regulation.[36] Generators are allowed to transport used oil in volumes less than 55 gallons at one time to either a used oil collection center or a used oil aggregation point without being regulated as a transporter.[37] Used oil transported from a household generator to any regulated used oil handler is not subject to the federal used oil standards; however, once this household oil reaches a used oil collection center or any other regulated entity, its further transportation is subject to the federal used oil standards.[38] If a shipment of used oil crosses international borders, it is subject to the federal used oil standards while it is within the United States.[39]

Table 2.3
Federal Standards for Used Oil Transporters and Transfer Facilities

Category	Requirements
Notification	Must notify EPA of their used oil handling activities and obtain an identification number.
Used oil storage at transfer facility	• Oil must be stored in a tank or container intended for storage purposes or in a unit sufficient for hazardous waste storage. • Storage unit must be equipped with a secondary containment system. • Storage unit must be maintained in good condition and not allowed to leak. • Storage unit must be labeled with the words "Used Oil." • If a used oil transfer facility stores used oil for longer than 35 days, the facility must also comply with the regulations for used oil processors.
Transfer facility response to release of used oil to the environment	• Must take action to prevent further release of used oil. • Must clean up what has been released. • Must manage the used oil that is recovered according to these regulations. • If a leaking storage unit caused the release, the unit must be fixed or replaced.
Used oil transportation	Must be delivered to another transporter, a processor or re-refiner, or an off-specification used oil burner with an EPA identification number or to an on-specification used oil burner.
Transporter response to release of used oil to the environment	Must respond to release in whatever manner necessary to "protect human health and the environment."[40]
Rebuttable presumption for used oil	• Required to establish the total halogen content of used oil that it transports. • Must maintain records of the information used to establish the halogen concentration for three years. • If a truck has previously been used to transport hazardous waste, but has not been emptied according to the regulations specified in the CFR, title 40, part 261.7[41] of the CFR prior to transporting used oil in it, then the used oil is considered to have been mixed with hazardous waste and is then subject to the hazardous waste regulations.
Tracking	Must maintain a record of each shipment received and each shipment transported for three years.
Reporting	None.
Transporters who are not also processors or re-refiners	May perform some minimal processing of the used oil, such as mixing of different shipments of used oil, as long as the purpose of the processing is not to recycle the used oil or derive other oil-based products from it.
Management of residues	Residues that result from the transportation or storage of used oil are still subject to the federal used oil standards if they are to be burned for energy recovery. If the materials are going to be disposed or reused beneficially, they are no longer considered used oil and are not subject to these regulations.

Adapted from: CFR, title 40, part 279, subpart E. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

Standards for Used Oil Processors and Re-Refiners

Any used oil processing or re-refining facility is subject to the federal used oil standards. Specific regulations governing used oil handling by processors and re-refiners are listed in Table 2.4. If a used oil transfer facility stores used oil for longer than 35 days, it must comply with the regulations for used oil processors and re-refiners.[42] However, both transporters and burners whose handling of used oil includes some "incidental processing" are exempted specifically from the regulations.[43] Used oil processors are allowed to perform limited burning of used oil, either in an on-site space heater or "incidentally to used oil processing," without being subject to the used oil burner regulations.[44]

Table 2.4
Federal Standards for Used Oil Processors and Re-Refiners

Category	Requirements
Notification	Must notify EPA of their used oil handling activities and obtain an identification number.
General facility standards—preparedness and prevention	Facilities must be operated in a safe manner so as to avoid emergencies such as fires or explosions. Must have equipment to respond to such an emergency as well as to alert both their employees and the local authorities. The facility should have arrangements with local emergency responders and hospitals in preparation for such an emergency.
General facility standards—contingency plan and emergency procedures	• Facility is required to have a contingency plan in the case of an environmental emergency. Must designate a primary emergency coordinator, who is either at the facility or available to respond to an emergency quickly and coordinate emergency response at the facility. Must include an inventory of all emergency equipment at the facility and must include an evacuation plan for facility personnel. • In an emergency, the emergency coordinator must notify employees at the facility and then determine whether the release poses a threat to human health or the environment outside of the facility. If so, the emergency coordinator must contact both local authorities and the National Response Center, informing them of the release and associated dangers. • The released used oil or any other material generated in clean up must be disposed or recycled, and the emergency coordinator must ensure that the facility is again prepared to respond to such an emergency. The EPA Regional Administrator must be notified before operations are resumed at the facility. • The incident must be recorded in the facility's operating records, and a written report must be submitted to EPA including the type and quantity of released material as well as any material recovered and an assessment of risk to human health and the environment outside of the facility.
Used oil storage	• Oil must be stored in a tank or container intended for storage purposes or in a unit sufficient for hazardous waste storage. • Storage unit must be equipped with a secondary containment system. • Storage unit must be maintained in good condition and not allowed to leak. • Storage unit must be labeled with the words "Used Oil."

Category	Requirements
	• When an aboveground tank or container previously used to store used oil is closed, any structures or equipment that have been in contact with the used oil must be decontaminated or removed and contaminated soil must be removed or remediated.
Rebuttable presumption for used oil	• Must establish the total halogen content of used oil under its control. • Must maintain records of the information used to establish the halogen concentration for three years.
Off-site shipment of used oil	Must use a transporter with an EPA identification number to ship used oil off-site.
Tracking	Must maintain a record of each shipment received and each shipment transported for three years.
Analysis plan	• Facility must have a written analysis plan to address both the rebuttable presumption for used oil and, if applicable, the determination of on-specification used oil. • Must specify whether analytical data or other knowledge will be used to determine the halogen content of the used oil or the parameters for meeting the used oil specifications. If analytical data is to be used, the sampling plan must specify the sampling method that will be used to obtain representative samples of the used oil and the frequency at which sampling will be performed. • The plan must also identify the analytical methods that will be used and whether the analysis will be performed at the facility or elsewhere.
Operating record	• An operating record for each used oil processing facility must be maintained to include the results of all analyses performed in accordance with the analysis plan as well as information regarding any incidents that trigger the implementation of the contingency plan. • The operating record must be maintained until the facility is closed.
Reporting	Must report biennially on the volume of used oil that were processed or re-refined at the facility in the previous calendar year and the processing or re-refining method used.
Management of residues	Residues that result from processing or storage of used oil are still subject to the federal used oil standards if they are to be burned for energy recovery. If the materials are going to be disposed or reused beneficially, they are no longer considered used oil and are not subject to these regulations.

Adapted from: CFR, title 40, part 279, subpart F. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

Standards for Burners of Off-Specification Used Oil

The regulations for used oil burners apply only to those who burn used oil that does not meet the appropriate fuel specifications. Burners of "on-specification" used oil are required to comply with the regulations for used oil marketers, outlined in subpart H[45] instead of the regulations for used oil burners.[46] Table 2.5 lists specific regulations governing used oil handling by burners of off-specification used oil. Generators may burn used oil in an on-site space heater, and processors may burn some used oil "incidentally" in the course of used oil processing. Generators and processors are not subject to the used oil burner regulations under those circumstances.[47]

Table 2.5
Federal Standards for Burners of Off-Specification Used Oil

Category	Requirements
Restrictions on burning	• Only certain devices are permitted to be used for the burning of off-specification used oil, including industrial furnaces, some boilers, and hazardous waste incinerators. • Off-specification used oil may be mixed with on-specification used oil if the mixture is to be burned, but the mixture is still considered off-specification even if the fuel specifications are achieved by dilution.
Notification	Must notify EPA of their used oil handling activities and obtain an identification number.
Rebuttable presumption for used oil	• Must establish the total halogen content of used oil under its control. • Must maintain records of the information used to establish the halogen concentration for three years.
Used oil storage	• Oil must be stored in a tank or container intended for storage purposes or in a unit sufficient for hazardous waste storage, • Storage unit must be equipped with a secondary containment system. • Storage unit must be maintained in good condition and not allowed to leak. • Storage unit must be labeled with the words "Used Oil."
Response to release of used oil to the environment	• Must take action to prevent further release of used oil. • Must clean up what has been released. • Must manage the used oil that is recovered according to these regulations. • If a leaking storage unit was the cause of the release, the unit must be fixed or replaced.
Tracking	Must maintain a record of each shipment received for three years.
Notices	• Must provide a certification that EPA has been notified of the used oil burning activities and that the burning of used oil will only be performed in a permitted device before the first shipment of used oil is accepted from a generator, transporter, or processor, the burner. • Must maintain the certification for three years after receiving the last shipment.
Management of residues	Residues that result from burning or storage of used oil are still subject to the federal used oil standards if they are to be burned for energy recovery. If the materials are going to be disposed or if they are going to be reused beneficially, they are no longer considered used oil and are not subject to these regulations.
Restrictions on burning of used oil containing PCBs	• Used oil to be burned for energy recovery is presumed to contain at least 2 ppm of PCBs unless a marketer has established and documented either through analytical data or other knowledge that the used oil does not contain PCBs. • Used oil containing PCBs may only be burned in units permitted by title 40, part 761[48] of the CFR. • Must provide a certification that EPA has been notified of the used oil burning activities and that the burning of used oil is performed in a permitted device before accepting the first shipment of used oil containing PCBs a marketer. A copy of the certification should be maintained by the burner.

Adapted from: CFR, title 40, part 279, subpart G. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005; and CFR, title 40, part 761, subpart B, rule 761.20(e). Online. Available: http://ecfr.gpoaccess.gov. Accessed: November 27, 2005.

Standards for Used Oil Fuel Marketers

A used oil fuel marketer either sends used oil to a burner of off-specification used oil or establishes that a shipment of used oil meets the fuel specifications and is no longer subject to the federal used oil standards. Specific regulations governing used oil handling by used oil fuel marketers are summarized in Table 2.6. The regulations presume that marketers, by nature of their business, will always fall into one of the other categories of used oil handler and must therefore also comply with the set of regulations that apply to other facets of their business.[49,50] Two exclusions from the regulations for used oil fuel marketers are allowed. First, generators and transporters who ship their used oil to a burner of off-specification used oil are considered marketers of used oil. However, if a generator or transporter ships used oil to a processor who then burns some used oil "incidentally," the used oil generator or transporter is not considered a used oil marketer.[51] Once a used oil marketer has asserted the claim that a shipment of used oil is on-specification, then any entity that later handles the same used oil and asserts the same claim would not be considered a used oil marketer.[52]

Table 2.6
Federal Standards for Used Oil Fuel Marketers

Category	Requirements
Notification	Must notify EPA of their used oil handling activities and obtain an identification number.
Off-specification used oil	May only be shipped to a registered used oil burner with an EPA identification number who uses permitted equipment for burning.
On-specification used oil	• Used oil fuel marketer must have analytical data or other information to establish that the fuel specifications are met. • Documentation must be maintained by the marketer for three years.
Tracking	• Must maintain a record of each shipment for three years both of off-specification used oil and of on-specification used oil shipments, if they are the first to establish that the oil meets the fuel specifications. • For shipments of on-specification used oil, these records must refer to the data used to demonstrate that the used oil met the fuel specifications.
Notices	• Before sending the first shipment of off-specification used oil to a burner, marketer must obtain a certification that (a) EPA has been notified of the used oil burning activities and (b) the burning of used oil will only be performed in a permitted device. • Certification must be maintained for three years after the last shipment has been sent to the burner.
Restrictions on marketing of used oil containing PCBs	• Used oil that is to be burned for energy recovery is presumed to contain at least 2 ppm of PCBs unless the marketer establishes and documents either through analytical data or other knowledge that the used oil does not contain more than 2 ppm of PCBs. Marketer must maintain records of the information used to determine that the used oil does not contain more than 2 ppm of PCBs. • Used oil containing PCBs may only be marketed to those used oil burners permitted by title 40, part 761 of the CFR or to other marketers who are registered with EPA.

Category	Requirements
	• Before sending the first shipment of used oil containing PCBs to a burner, the marketer must obtain a certification that EPA has been notified of the used oil burning activities and that the burning of used oil will only be performed in a permitted device. Marketer must maintain the certification.

Adapted from: CFR, title 40, part 279, subpart H. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005; and CFR, title 40, part 761, subpart B, rule 761.20(e). Online. Available: http://ecfr.gpoaccess.gov. Accessed: November 27, 2005.

Disposal of Used Oil

The used oil standards were written with the presumption that all used oil can be recycled, while recognizing that some used oils will be disposed of instead of being pre-laden oil recycled.[53] Federal used oil standards specifically prohibit the use of used oil as a dust suppressant unless a state has been explicitly allowed to have such a program in place,[54] and no state, including Texas, has such a program. If used oil is to be disposed (either as a solid waste or as a hazardous waste), the federal used oil standards no longer govern its handling as used oil.[55,56] Used oil that has been determined to be a hazardous waste must be disposed according to the hazardous waste regulations in the CFR.[57,58,59] Disposal of used oil as a solid waste (that is not hazardous) is governed by regulations found in the CFR, title 40, parts 257 and 258.[60]

Standards for Used Oil Filters

The federal used oil standards do not regulate used oil filters directly. In the hazardous waste regulations, there exists one class of used oil filters, those that are "non-terne" (meaning they are not coated in a lead-containing alloy), that are exempted from regulation as a hazardous waste if the used oil filter is not mixed with a listed hazardous waste and has been gravity hot-drained.[61] Used oil processors can punch two holes in the filter, one at the seam and one at the top, and drain the trapped oil to be re-refined.[62]

Conclusions

The federal used oil standards provide a general framework for used oil handlers to manage used oil operations and minimize the potential for environmental impact; however, the system as proscribed largely relies on self-regulation and enforcement. Two mechanisms for governmental oversight are the required registration for all used oil handlers other than generators and required reporting by used oil processors. However, implementation and oversight of a used oil management program is largely left to individual states as long as the state regulations are at least as strict as the federal used oil standards. Used oil regulations in the State of Texas are discussed in the next chapter.

Notes

[1] United States Department of Energy (DOE), Office of Fossil Energy, *Used Oil Re-Refining Study to Address Energy Policy Act of 2005 Section 1838* (Washington, D.C., July 2006), p. 2-1.

[2] DOE, *Used Oil Study*, p. 2-2.

[3] United States Congress, House, *Energy Policy Act of 2005*, House Bill 6, 109th Congress, 1st session (2005). Online. Available: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_bills&docid=f:h6enr.txt.pdf. Accessed: April 20, 2006.

[4] United States Environmental Protection Agency (EPA), *Final Rule: 40 CFR Parts 260, 261, 266, 271 and 279 - Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Recycled Used Oil Management Standards* (September 21, 1992). Online. Available: http://www.epa.gov/epaoswer/hazwaste/usedoil/fr/fr091092.txt. Accessed: September 23, 2005.

[5] Ibid.

[6] Code of Federal Regulations (CFR), title 40, part 279. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[7] Ibid.

[8] CFR, title 40, part 279, subpart A. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[9] Bob Boughton and Arpad Horvath, "Environmental Assessment of Used Oil Management Methods," *Environmental Science and Technology*, vol. 38, no. 2 (2004), p. 354.

[10] Jacob Voogd and Louis Magnabosco, "Tipping the Scales for Rerefining," *Lubes'N'Greases*, vol. 12, no. 6 (June 2006), p. 15.

[11] Boughton and Horvath, "Environmental Assessment of Used Oil Management Methods," p. 354.

[12] CFR, title 40, part 279, subpart B, rule 279.11. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[13] CFR, title 40, parts 260-268. Online. Available: http://ecfr.gpoaccess.gov. Accessed: December 8, 2005.

[14] CFR, title 40, parts 261, subpart D. Online. Available: http://ecfr.gpoaccess.gov. Accessed: December 8, 2005.

[15] CFR, title 40, part 261. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 19, 2005.

[16] CFR, title 40, part 279, subpart B, rule 279.10. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[17] Ibid.

[18] CFR, title 40, part 761. Online. Available: http://ecfr.gpoaccess.gov. Accessed: November 29, 2005.

[19] CFR, title 40, part 279, subpart B, rule 279.10.

[20] CFR, title 40, part 279, subpart I. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[21] CFR, title 40, part 279, subpart C. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[22] CFR, title 40, part 279, subpart E. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[23] CFR, title 40, part 279, subpart B, rule 279.12. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[24] CFR, title 40, part 279, subpart I.

[25] CFR, title 40, part 279, subpart A.

[26] CFR, title 40, part 279, subpart C, rule 279.20. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[27] Ibid.

[28] Ibid.

[29] Ibid.

[30] Ibid.

[31] Ibid.

[32] CFR, title 40, part 279, subpart C, rule 279.23. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[33] CFR, title 40, part 279, subpart C. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[34] CFR, title 40, part 279, subpart D. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[35] Ibid.

[36] CFR, title 40, part 279, subpart E, rule 279.40. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[37] Ibid.

[38] Ibid.

[39] Ibid.

[40] CFR, title 40, part 279, subpart E, rule 279.43. Online. Available: http://ecfr.gpoaccess.gov. Accessed October 11, 2005.

[41] CFR, title 40, part 261, subpart A, rule 261.7. Online. Available: http://ecfr.gpoaccess.gov. Accessed December 9, 2005.

[42] CFR, title 40, part 279, subpart E, rule 279.45. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[43] CFR, title 40, part 279, subpart E, rule 279.50. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[44] Ibid.

[45] CFR, title 40, part 279, subpart H. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[46] CFR, title 40, part 279, subpart E, rule 279.60. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[47] Ibid.

[48] CFR, title 40, part 761.

[49] CFR, title 40, part 279, subpart H, rule 279.70. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[50] EPA, *Final Rule: 40 CFR Parts 260, 261, 266, 271 and 279 - Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Recycled Used Oil Management Standards.*

[51] CFR, title 40, part 279, subpart H, rule 279.70.

[52] Ibid.

[53] EPA, *Final Rule: 40 CFR Parts 260, 261, 266, 271 and 279 - Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Recycled Used Oil Management Standards*.

[54] CFR, title 40, part 279, subpart I, rule 279.82. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[55] CFR, title 40, part 279, subpart A.

[56] CFR, title 40, part 279, subpart I, rule 279.81. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005.

[57] CFR, title 40, parts 260 through 265. Online. Available: http://ecfr.gpoaccess.gov. Accessed: December 9, 2005.

[58] CFR, title 40, parts 268 and 270. Online. Available: http://ecfr.gpoaccess.gov. Accessed: December 9, 2005.

[59] CFR, title 40, part 124. Online. Available: http://ecfr.gpoaccess.gov. Accessed: December 9, 2005.

[60] CFR, title 40, parts 257 and 258. Online. Available: http://ecfr.gpoaccess.gov. Accessed: December 9, 2005.

[61] CFR, title 40, part 261, subpart A, rule 261.4. Online. Available: http://ecfr.gpoaccess.gov. Accessed: December 19, 2005.

[62] Scotti Lee, facsímile to David Eaton, August 07, 2007.

Chapter 3. Texas Used Oil Regulations

Handling of used oil in Texas is subject to relevant state regulations in addition to the federal used oil standards. The State of Texas regulates used oil through the Texas Administrative Code (TAC), title 30, part 1, chapter 324, entitled "Used Oil Standards" (Texas used oil standards)[1] and used oil filters in the TAC, title 20, part 1, chapter 328, subchapter D, entitled "Used Oil Filter Management and Recycling" (Texas used oil filter standards).[2] This chapter describes these regulations.

The Texas used oil standards incorporate and supplement all of the federal used oil standards.[3] Enforcement of used oil standards is left to states; therefore, state regulations can interpret various federal regulations. The federal regulations require registration and reporting for certain sectors of the used oil industry, but state regulations specify how that requirement can be fulfilled. The Texas used oil standards also reference other relevant state regulations that must be followed in particular situations, such as when used oil is stored in underground storage tanks (USTs) or when used oil is spilled. This chapter only describes those parts of the state used oil standards that augment the federal used oil standards.

The handling and management of used oil is subject to both the federal used oil standards and state used oil standards throughout its lifecycle, as discussed in Chapter 2. The state used oil standards clarify that used oil is not subject to regulation until is considered a "spent material," meaning that it has been used, but can no longer be used for its original purpose.[4,5,6] Texas used oil standards also regulate used oil from its generation until it meets one of six ends: processing or re-refining; burning; reuse; or disposal as a solid waste, hazardous waste, or a waste containing polychlorinated biphenyls (PCBs).

State used oil standards prohibit any handling of used oil that will harm human health or the environment. Texas used oil standards specify that oily water that is or will undergo oil-water separation must be managed in accordance with these regulations.[7] State standards prohibit the discharge of used oil into a sewer system or any surface water or groundwater as well as the mixing of used oil with waste that is destined for a landfill. As with the federal used oil standards, direct application of used oil to land, as a dust suppressant or otherwise, is prohibited.[8] State used oil standards specify that if used oil is also a hazardous waste, it must be managed according to the regulations outlined in the TAC, title 30, chapter 335, entitled "Industrial Solid Waste and Municipal Hazardous Waste,"[9] in addition to the applicable federal regulations.[10]

Texas Standards for Used Oil Generators, Collection Centers, Transporters, and Transfer Facilities

Texas state regulations clarify standards for used oil generators, collection centers, transporters and transfer facilities.

If a business services a customer's vehicles at the customer's home or business and transports the resulting used oil in quantities less than 55 gallons at one time, the business may opt to be identified as the generator. If the business chooses not to be identified as the generator, the customer is considered the generator.[11]

Texas does not require used oil collection centers to determine the halogen content of household used oil, as is normally required under the rebuttable presumption of the federal used oil standards. Collection centers that do collect household used oil are required to post signage to advertise that they accept household used oil.[12] All collection centers must register with the Texas Commission on Environmental Quality (TCEQ) within 30 days of beginning operation as a used oil collection center and then again by January 25th of every odd numbered year. Collection centers that close or stop collecting household used oil must also notify TCEQ. Collection centers must report to TCEQ annually the volume of used oil collected, and collection centers that collect from both household generators and from other generators must report a separate volume for each of these two categories.[13]

Used oil transporters, are required to register with TCEQ once when they enter the business.[14] Transporters or transfer facilities that store used oil in underground storage tanks (UST) must comply with the regulations governing USTs in the TAC, title 30, chapter 334, entitled "Underground and Aboveground Storage Tanks."[15,16]

Additional Standards for Used Oil Processors, Re-Refiners, Burners, and Marketers

Texas regulations clarify regulations for businesses that process, re-refine, burn, or dispose of used oil. These modifications to the federal regulations are discussed below.

Used oil processors, re-refiners, burners, and marketers are all required to register with TCEQ once when they begin handling used oil.[17,18,19] Used oil processors and re-refiners also must submit a reporting form to TCEQ by January 25th of every even-numbered year.[20] Used oil that is stored by in USTs at used oil processing, re-refining, or burning facilities is also subject to the regulations governing USTs in the TAC, title 30, chapter 334.[21,22,23]

The federal used oil standards require that a written analysis plan be prepared for every used oil processing facility to address whether a shipment of used oil is hazardous waste and whether the used oil is off-specification. Texas used oil standards also require that the plan describe how to handle used oil to avoid its mixing with hazardous waste and to handle used oil if it is hazardous. However, Texas does not require a plan if the used oil processor does not process used oil from other generators and has information to establish whether the used oil has not been mixed with hazardous waste and if it meets federal fuel specifications.[24]

Other General Regulations

Texas standards regulate other topics applicable to all used oil handlers, including spills, contamination with PCBs, soil remediation requirements, and registration suspension, for example. Violation of any part of the state used oil standards may lead to the suspension of a facility's used oil registration, typically for one year. A second suspension results in the permanent revocation of the registration. If a facility's registration has been suspended or revoked, the facility may not handle or manage used oil.[25]

State regulations governing spills of used oil (title 30, part 1, chapter 327[26]) establish reportable quantities for various materials; these are quantifiable limits above which a spill must be reported to authorities.[27,28] A spill to land of more than 25 gallons of used oil (for most facilities) or 210 gallons (for facilities exempt from petroleum storage tank regulations) must be reported. A spill of used oil into a water body that creates a sheen must be reported.[29] State regulations note that burning of used oil containing PCBs is to be performed only under the federal regulations outlined in the Code of Federal Regulations (CFR), title 40, part 761, rule 761.20(e).[30,31]

Used oil handlers (not including used oil generators) must demonstrate that they have the financial resources to respond to a release of used oil. The amount of financial assurance required depends on the size of the area used for handling of used oil at the facility that is unpaved, known as the "active" area.[32] Used oil handlers can comply with the soil remediation requirements in one of two ways. A used oil handler may demonstrate that the full cost required would be available by obtaining an applicable insurance policy, bond, providing a corporate guarantee, establishing a trust fund, or any other financial assurance mechanisms described in the TAC, title 30, part 1, chapter 37, subchapter C.[33,34] Alternatively, a used oil handler can provide financial assurance of 10 percent of the total required financial reserve if the business documents additional preventive measures to avoid a release. Under this approach, the used oil handler must provide secondary containment for all areas of used oil handling or storage for longer than 24 hours. The secondary containment system must be able to contain the amount of used oil held by any used oil container at the facility along with the precipitation from a significant rain event and prevent the release of the used oil or rainwater. A licensed professional engineer must certify that all used oil containers have been properly designed and remain intact. The used oil handler must also certify annually to TCEQ that handling activities at the facility are performed according to the state used oil standards and notify TCEQ of any used oil spills of 25 gallons or more.[35]

The tax administration section of the TAC also allows for the Comptroller of the State of Texas to collect a fee of $0.04 per gallon "on the first actual sale of automotive oil…to a purchaser who is not an automotive oil manufacturer or distributor."[36] Distributors are required to be permitted by the Comptroller, and then the manufacturer or distributor who makes the first sale is required to report quarterly to the Comptroller the volume of first sales in that quarter and submit the appropriate payment (less 1 percent allowed to be retained for administrative costs). Sales to registered used oil collection centers or collection centers that accept household used oil are exempt from these fees. The volume

of oil sold in the quarter is required to be reported even if no fee is due because the sales were exempt.[37]

The Texas Health and Safety Code indicates that money generated by this fee is to be deposited into a "Used Oil Recycling Account" which may be used to administer the used oil recycling program and register used oil handlers as required by the state used oil standards, as well as to make grants to used oil collection centers and inform the public.[38] The state comptroller's office reports that more than $1.2 million was collected by the automotive oil sales fee in 2005.[39]

State Used Oil Filter Standards

Although the federal government does not prescribe the handling of used oil filters, Texas has established regulations for used oil filters under TAC, title 30, part 1, chapter 328, subchapter D, entitled "Used Oil Filter Management and Recycling" (Texas used oil filter standards).[40] Eleven terms are defined and used throughout the regulations.[41] Among these is the definition of a "used oil filter" as well as the four categories of individuals or businesses whose handling of used oil filters are regulated: generators, transporters, storage facilities, and processors (see Table 3.1).

Table 3.1
Definition of Terms in the Texas Used Oil Filter Standards

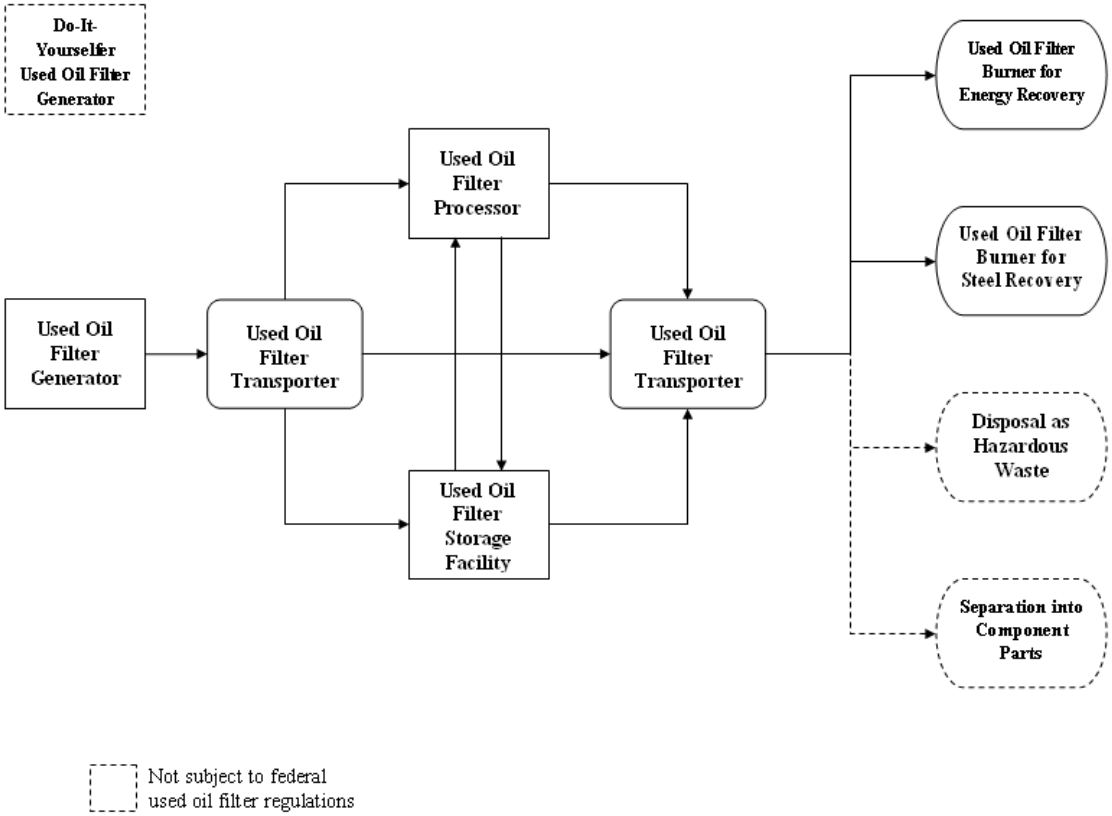
Term	Definition
Do-it-yourselfer	An individual who maintains his own personal car or farm equipment and removes a used oil filter in the process.
Generator	An individual or business that removes used oil filters in the course or maintaining a business vehicle. Does not include do-it-yourselfers.
Processor	An individual or business who takes used oil filters generated by others and makes them ready for recycling, burning, or disposal. Does not include generators who prepare their own used oil filters for recycling or disposal.
Storage facility	Any facility where a used oil filter is kept for a time after it has left the generator, but before it is recycled or disposed.
Transporter	An individual or business that moves used oil filters to another location in the course of processing, recycling, or disposing.
Used oil filter	A piece of material that has been used to remove impurities from free-flowing oil, but has been removed from the system.

Adapted from: Texas Administrative Code, title 30, part 1, chapter 328, subchapter D, rule 328.21. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

Figure 3.1 illustrates the hypothetical lifecycle of a used oil filter. Texas standards prescribe the handling of used oil filters from the point that a used oil filter generator produces it, through each of the various other handlers who may have it in their possession, until it meets one of four ends: burning for energy or steel recovery; disposal

as a hazardous waste; or being broken down into parts. Used oil filters that are determined to be hazardous wastes are then subject to the regulations for management and disposal of hazardous waste outlined in the CFR, title 40, parts 260 through 268.[42] If the used oil filter is broken down into its parts, it will no longer be regulated as a used oil filter. Used oil filters must be managed so that used oil is not released into the environment. Used oil filters are not to be disposed of in a regulated landfill. Used oil filters must be stored in containers that are not leaking, are waterproof, and are maintained properly.[43] Some segments of the used oil lifecycle are not regulated under Texas used oil filter standards. Those activities are shown on Figure 3.1 with dashed lines. Household used oil filters are not subject to these regulations until they reach a regulated used oil handler. However, the business of disposing of oil filters is poised to change with the proliferation of 'cartridge' style filters.[44]

Figure 3.1
Regulated Lifecycle of a Used Oil Filter



Adapted from: Texas Administrative Code, title 30, part 1, chapter 328, subchapter D. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

Texas standards establish regulations specific to used oil filter generators, transporters, storage facilities, and processors (see Tables 3.2, 3.3, 3.4, and 3.5, respectively). The regulations include recordkeeping requirements for tracking of used oil filter shipments, limits on the length of time used oil filters are stored and the volume of used oil filters transported, as well as requirements for some categories to provide financial assurance for soil remediation.

Table 3.2
Texas Standards for Used Oil Filter Generators

Category	Requirements
Registration	None
Reporting	None
Shipment records	• Must include a bill of lading with each shipment. • Must maintain a copy of the bill of lading for three years.
Limitations on storage	May not store more a volume of used oil filters greater than that of six 55-gallon drums or store used oil filters in more than one bulk container without obtaining a variance from TCEQ.
Limitations on transportation	May not transport a volume of used oil filters greater than that of two 55-gallon drums.

Adapted from: Texas Administrative Code, title 30, part 1, chapter 328, subchapter D. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

Table 3.3
Texas Standards for Used Oil Filter Transporters

Category	Requirements
Registration	Must register with TCEQ in every even-numbered year.
Financial assurance	Must provide evidence at the time of registration of an applicable insurance policy, bond, a corporate guarantee, trust fund, or any of the other financial assurance mechanisms described in the TAC, title 30, part 1, chapter 37, subchapter C.
Reporting	Must report to TCEQ the number of used oil filters transported in the two preceding years by January 25th of every even-numbered year.
Shipment records	• Must include a bill of lading with each shipment. • Must maintain a copy of the bill of lading for three years.
Limitations on storage	• May not store more a volume of used oil filters greater than that of six 55-gallon drums or store used oil filters in more than one bulk container without obtaining a variance from TCEQ. • May not store used oil filters for longer than 10 days without obtaining a variance from TCEQ.

Adapted from: Texas Administrative Code, title 30, part 1, chapter 328, subchapter D. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

Table 3.4
Texas Standards for Used Oil Filter Storage Facilities

Category	Requirements
Registration	Must register with TCEQ in every even-numbered year.
Financial assurance	Must provide evidence at the time of registration of an applicable insurance policy, bond, a corporate guarantee, trust fund, or any of the other financial assurance mechanisms described in the TAC, title 30, part 1, chapter 37, subchapter C.
Reporting	Must report to TCEQ the number of used oil filters stored in the two preceding years by January 25th of every even-numbered year.
Shipment records	• Must include a bill of lading with each shipment. • Must maintain a copy of the bill of lading for three years.
Limitations on storage	May not store used oil filters for longer than 120 days without obtaining a variance from TCEQ.
Limitations on transportation	May not transport a volume of used oil filters greater than that of two 55-gallon drums.
Spill prevention and control	Must have a spill prevention and control plan in place.

Adapted from: Texas Administrative Code, title 30, part 1, chapter 328, subchapter D. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

Table 3.5
Texas Standards for Used Oil Filter Processors

Category	Requirements
Registration	Must register with TCEQ in every even-numbered year.
Financial assurance	Must provide evidence at the time of registration of an applicable insurance policy, bond, a corporate guarantee, trust fund, or any of the other financial assurance mechanisms described in the TAC, title 30, part 1, chapter 37, subchapter C.[45]
Reporting	Must report to TCEQ the number of used oil filters processed in the two preceding years by January 25th of every even-numbered year.
Shipment records	• Must include a bill of lading with each shipment and • Must maintain a copy of the bill of lading for three years.
Limitations on storage	• May not store used oil filters for longer than 30 days before processing them without obtaining a variance from TCEQ. Storage containers must be labeled with "Used Oil Filters."
Limitations on transportation	May not transport a volume of used oil filters greater than that of two 55-gallon drums.
Spill prevention and control	Must have a spill prevention and control plan in place.

Adapted from: Texas Administrative Code, title 30, part 1, chapter 328, subchapter D. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

In addition, used oil filter handling activities are tracked through required registration for any used oil filter business (other than those that are only generators), and regular data reporting by used oil filter processors.[46]

Conclusions

The Texas state regulations clarify the federal used oil standards, augment them with used oil filter standards (which are not specifically addressed in the federal regulations), and expand the scope of the used oil regulation and reporting system. The federal standards require the one-time registration of used oil collection centers but do not require any data reporting, but Texas regulations require that collection centers renew their registration biennially and report the volume of used oil received annually. Texas also requires the fee from the first sale of automotive oil fund a Used Oil Recycling Account. The next chapter discusses the quality of data collected by the system.

Notes

[1] Texas Administrative Code (TAC), title 30, part 1, chapter 324. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[2] TAC, title 30, part 1, chapter 328, subchapter D. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

[3] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.1. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[4] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.3. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[5] TAC, title 30, part 1, chapter 335, subchapter A, rule 335.17. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 27, 2005.

[6] Code of Federal Regulations (CFR), title 40, part 261, subpart A, rule 261.1. Online. Available: http://ecfr.gpoaccess.gov. Accessed: November 27, 2005.

[7] Ibid.

[8] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.4. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[9] TAC, title 30, part 1, chapter 335. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 27, 2005.

[10] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.3.

[11] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.6. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[12] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.7. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[13] Ibid.

[14] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.11. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[15] TAC, title 30, part 1, chapter 334. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 27, 2005.

[16] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.11.

[17] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.12. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[18] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.13. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[19] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.14 . Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[20] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.12.

[21] TAC, title 30, part 1, chapter 334. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 27, 2005.

[22] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.12.

[23] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.13.

[24] Ibid.

[25] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.21. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[26] TAC, title 30, part 1, chapter 327. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 27, 2005.

[27] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.15. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[28] TAC, title 30, part 1, chapter 327, rule 327.4. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 27, 2005.

[29] Ibid.

[30] CFR, title 40, part 761, subpart B, rule 761.20(e). Online. Available: http://ecfr.gpoaccess.gov. Accessed: November 27, 2005.

[31] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.16. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[32] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.22. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

[33] TAC, title 30, part 1, chapter 37, subchapter C. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

[34] TAC, title 30, part 1, chapter 324, subchapter A, rule 324.22.

[35] Ibid.

[36] TAC, title 34, part 1, chapter 3, subchapter AA, rule 3.701. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: May 15, 2006.

[37] Ibid.

[38] Texas Health and Safety Code, title 5, chapter 371, section 371.061. Online. Available: http://www.capitol.state.tx.us/statutes/hs.toc.htm. Accessed: April 20, 2006.

[39] Email from Elizabeth Richmond, Texas Comptroller of Public Accounts, Open Records Division, "Request Regarding Automotive Oil Fee," to Amanda Van Epps, May 26, 2006.

[40] TAC, title 30, part 1, chapter 328, subchapter D. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

[41] TAC, title 30, part 1, chapter 328, subchapter D, rule 328.21. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

[42] CFR, title 40, parts 260 through 268. Online. Available: http://ecfr.gpoaccess.gov. Accessed: December 8, 2005.

[43] TAC, title 30, part 1, chapter 328, subchapter D, rule 328.23. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

[44] John Denholm, Oil Changer, Inc., letter to David Eaton (August 16, 2007).

[45] TAC, title 30, part 1, chapter 37, subchapter C. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

[46] TAC, title 30, part 1, chapter 328, subchapter D, rule 328.24. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: November 28, 2005.

Chapter 4. Existing Data for Used Oil Handlers in El Paso County

Under federal and Texas regulations pertaining to the used oil industries, entities that collect, transport, process, re-refine, burn, or market used oil must register with the Texas Commission on Environmental Quality (TCEQ). Only used oil collection centers and used oil processors must submit reports regularly on the volume of used oil that they handle during the year. Other industry participants are not required to submit data to TCEQ or the United States Environmental Protection Agency (EPA). This chapter reports on the data reported by the used oil industry within El Paso County, Texas, to illustrate the quality of collected information.

Registration

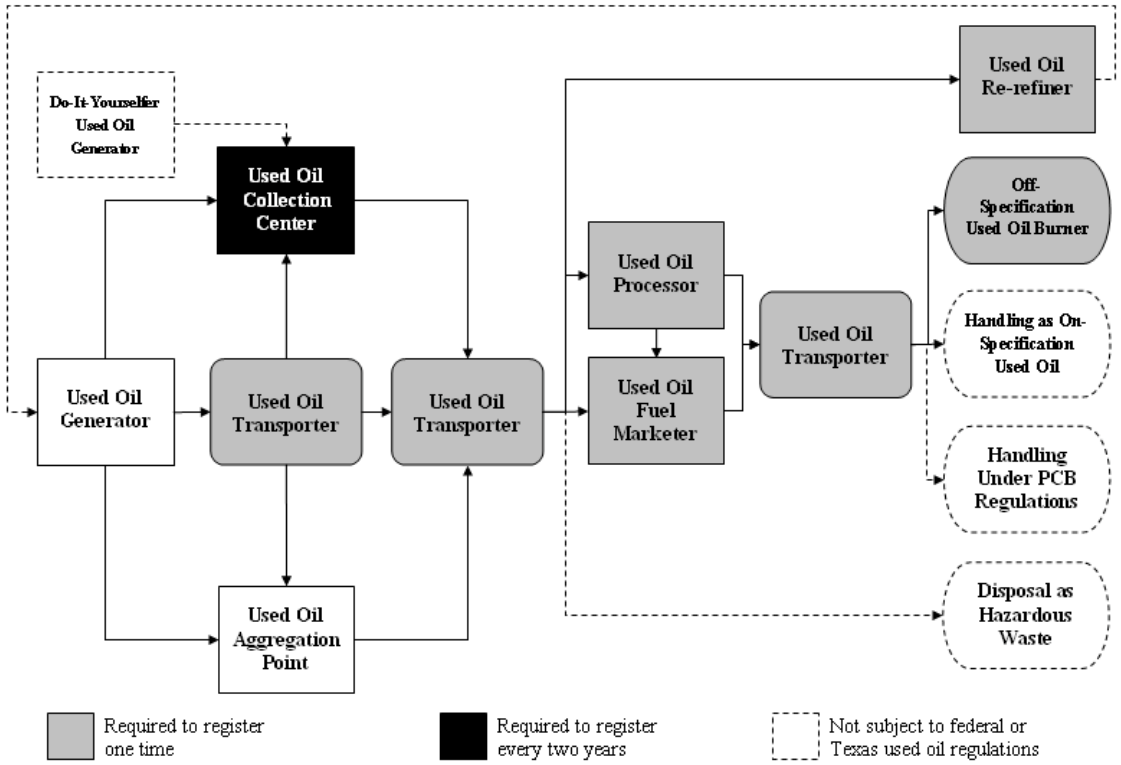
Registration requirements vary among the various used oil handlers (see Table 4.1). Other than generators, used oil handlers register with TCEQ at least one time, and used oil collection centers and aggregation points are required to renew the registration every two years. Entities that must renew their registration with TCEQ are shown in black on Figure 4.1. Entities that must register one time are shown in gray, and the white boxes indicate that there is no requirement for registration.

Table 4.1
Frequency of Required Registration with TCEQ

Category	Registration Requirement
Used oil generator	None
Used oil collection center or aggregation point	Every two years
Used oil transporter	One-time
Used oil processor or re-refiner	One-time
Burner of off-specification used oil	One-time
Used oil fuel marketer	One-time

Adapted from: Code of Federal Regulations (CFR), title 40, part 279. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005; and Texas Administrative Code (TAC), title 30, part 1, chapter 324, subchapter A. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

Figure 4.1
Summary of Registration Requirements



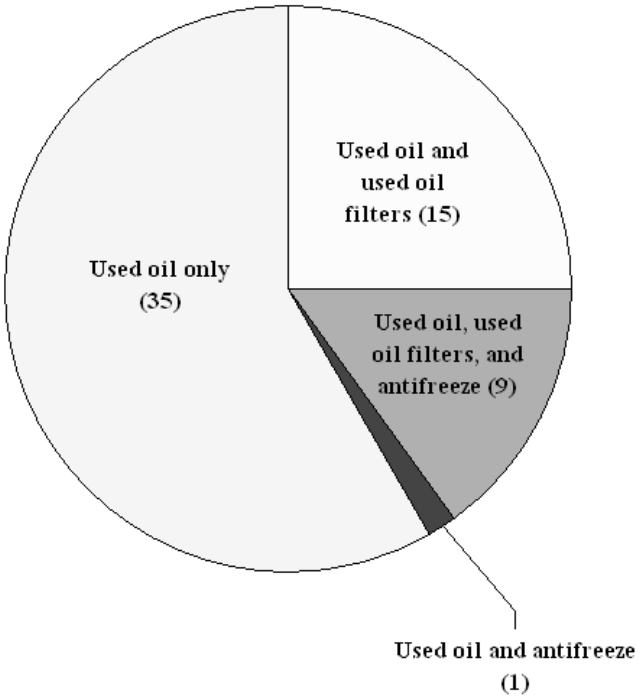
Adapted from: CFR, title 40, part 279. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005; and TAC, title 30, part 1, chapter 324, subchapter A. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

Used oil collection centers register by providing identifying information, such as the name and address of the company and a representative, and stating whether they collect oil directly from households or other generators.[1] Used oil handlers register by providing similar identifying information as well as the type of activity being performed: transporter, transfer facility, processor, re-refiner, burner of off-specification used oil, marketer who first claims used oil is on-specification, or marketer who directs shipments of off-specification used oil to a burner. Used oil transporters must identify all vehicles used to transport used oil. Used oil transfer facilities and processors/re-refiners must indicate the size of the facility and attach a diagram of the facility indicating the areas where used oil is transported, stored, or processed. Any of the registering used oil handlers must provide evidence of financial assurance, as discussed in Chapter 3.[2]

There are 60 registered used oil collection centers in El Paso County.[3] The majority of these entities collect only used oil, although some have also reported collecting used oil filters or antifreeze,[4] as shown in Figure 4.2. All 60 registered used oil collection centers

collect used oil from household generators, but only three are registered to collect used oil from other commercial or industrial generators.[5]

Figure 4.2
Used Oil Collection in El Paso County



Adapted from: Texas Commission on Environmental Quality, Office of Permitting, Remediation and Registration, Registration and Reporting Section, WWC Crystal Database Report on "Registered Used Oil Collection Centers." Requested November 15, 2005, returned by TCEQ employee Mansoor Ahmed on November 28, 2005.

As of November 28, 2005, there were 13 used oil handlers (other than collection centers) registered with TCEQ in El Paso County.[6] Table 4.2 lists their activities. More than half of the registered used oil handlers are registered for more than one type of used oil handling activity.[7]

Table 4.2
Used Oil Handlers Registered in El Paso County

Category of Used Oil Handler	Number Registered in El Paso County
Used oil transporter	12
Used oil transfer facility	7
Used oil fuel marketers who first claim that shipments of used oil is on-specification	4
Used oil fuel marketers who direct shipments of off-specification used oil	3
Used oil processors	3
Total registered handlers	13

Adapted from: Texas Commission on Environmental Quality, Office of Permitting, Remediation and Registration, Registration and Reporting Section, WWC Crystal Database Report on "Registered Used Oil Handlers." Requested November 15, 2005, returned by TCEQ employee Mansoor Ahmed on November 28, 2005.

TCEQ does offer the public access to an online database of regulated entities. Searches can be performed for specific registrants if the registration number, registrant name, or address of the registrant is known. Alternatively, a query of all registrants can be performed based on the program of interest (e.g., used oil), zip code, city, or county. A search for regulated entities in the used oil program in El Paso County, for example, returns 131 such entities.[8] Records associated with each of these entities contain facility information such as address, owner or operator information (both current and previous), TCEQ registration number, and the status of their registration. The records do not list information regarding the type of used oil activity in which the facility is engaged, nor do any quantity data appear in this format.

Reporting

As shown in Table 4.3, reporting requirements vary among the various used oil handlers. Used oil collection centers are required to report by January 25th of each year the volume of used oil that the facility itself generated, collected from other commercial or industrial generators, and received from household generators. In addition, each collection center is expected to identify the transporters used for off-haul of used oil from the facility.[9] By January 25th of each even-numbered year, used oil processors/re-refiners must report to TCEQ the volume of used oil either processed or re-refined in the previous (odd-numbered) year only and the method used.[10]

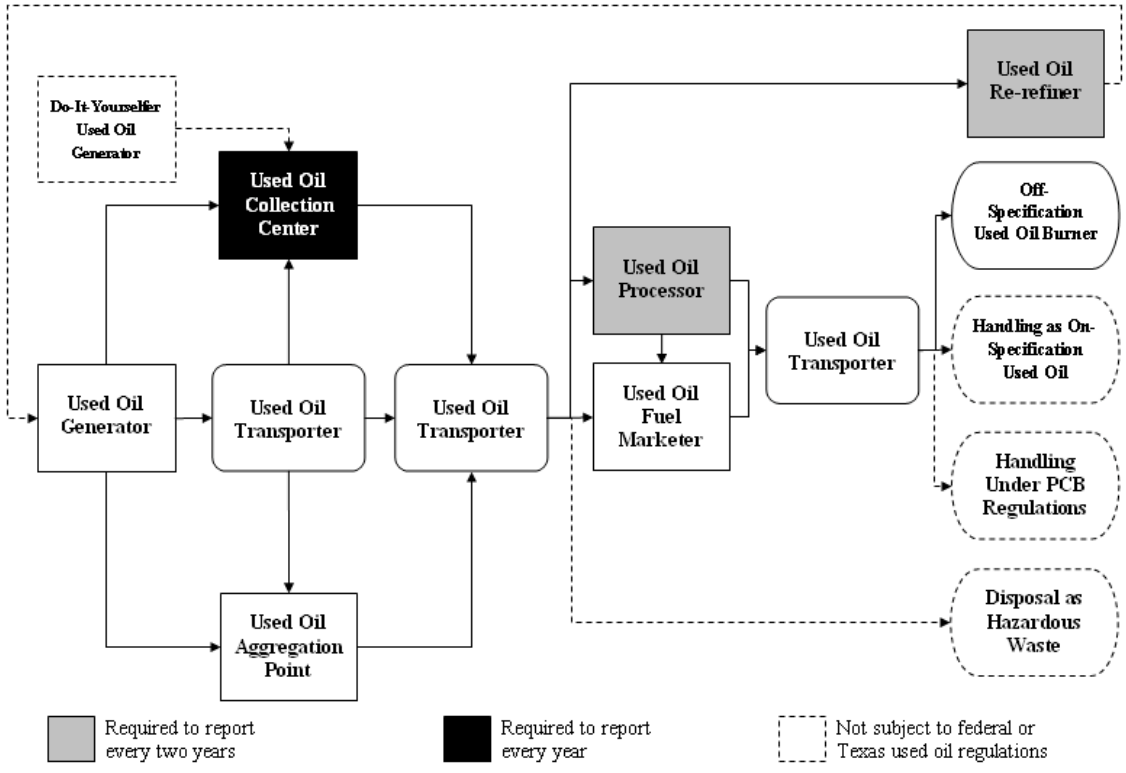
Table 4.3
Frequency of Required Reporting to TCEQ

Category	Reporting Requirement
Used oil generator	None
Used oil collection center / aggregation point	Annually
Used oil transporter	None
Used oil processor/re-refiner	Every two years
Burner of off-specification used oil	None
Used oil fuel marketer	None

Adapted from: CFR, title 40, part 279. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005; and TAC, title 30, part 1, chapter 324, subchapter A. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

Used oil generators, transporters, burners, and marketers are not required to report to TCEQ (see Figure 4.3). Entities that must report volumes of used oil handled to TCEQ annually are shown in black, entities that must report only biennially are shown in gray, and the white boxes indicate that there is no requirement for reporting.

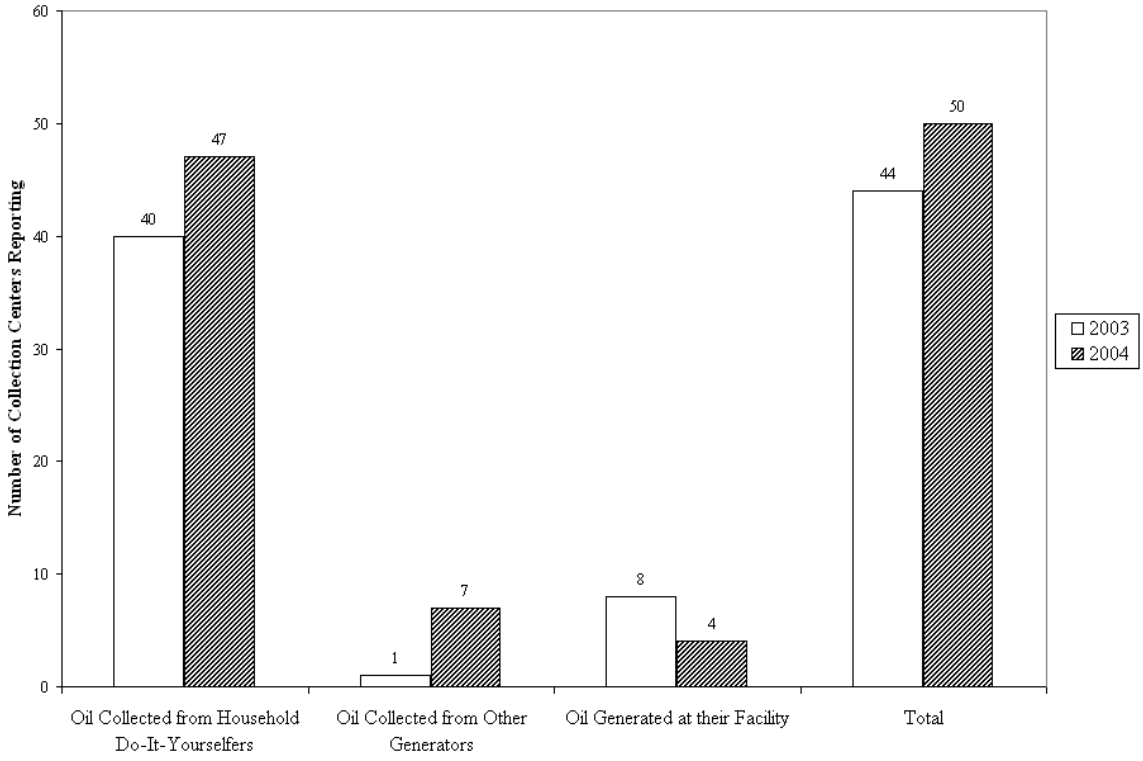
Figure 4.3
Summary of Reporting Requirements



Adapted from: CFR, title 40, part 279. Online. Available: http://ecfr.gpoaccess.gov. Accessed: October 11, 2005; and TAC, title 30, part 1, chapter 324, subchapter A. Online. Available: http://info.sos.state.tx.us/pls/pub/readtac$ext.viewtac. Accessed: October 11, 2005.

A query of the reporting database indicated that 44 used oil collection centers in El Paso County reported used oil collected for 2003 and 50 used oil collection centers reported used oil collected for 2004.[11] At least seven of the 60 used oil collection centers actively registered with TCEQ as of November 28, 2005 did not report any used oil handling activities to TCEQ for 2003 or 2004 to TCEQ.[12,13] The data presented in Figure 4.4 indicate that nearly all of the used oil collection centers reporting to TCEQ in 2003 and 2004 reported volumes of used oil collected from household generators, while only a handful in each year reported either a volume collected from other commercial or industrial generators or a volume generated at their own facility.

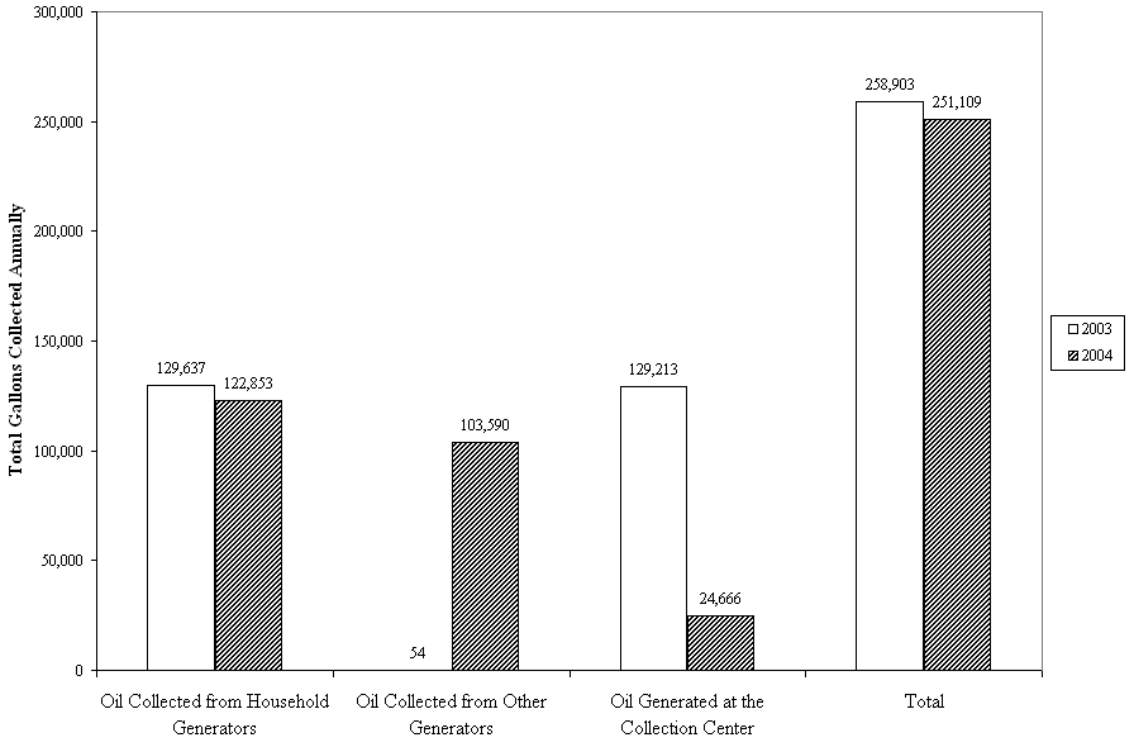
Figure 4.4
Used Oil Collection Centers Reporting to TCEQ



Adapted from: Texas Commission on Environmental Quality, Office of Permitting, Remediation and Registration, Registration and Reporting Section, WWC Crystal Database Report on "Used Oil Collection Centers Reporting." Requested October 5, 2005, returned by TCEQ employee Mansoor Ahmed on October 18, 2005.

The volume of used oil collected from household generators accounted for approximately half of the used oil collected at used oil collection centers in each year, as shown on Figure 4.5. Used oil collection centers reported almost no used oil collected from other generators in 2003, and oil from the collection center itself constituted the other half of used oil collected at these facilities. The situation reversed in 2004, and the number of facilities reporting used oil collected from other generators increased from one to seven, and the number of facilities reporting volumes of used oil collected from their own facility declined from eight to four. The volume of used oil reported collected from the collection centers themselves declined in 2004, and used oil collected from other generators accounted for approximately 40 percent of all used oil collected at used oil collection centers. The cause of such variability in the data is not known. However, the total volume of used oil reported as received by used oil collection centers was similar in the two years.

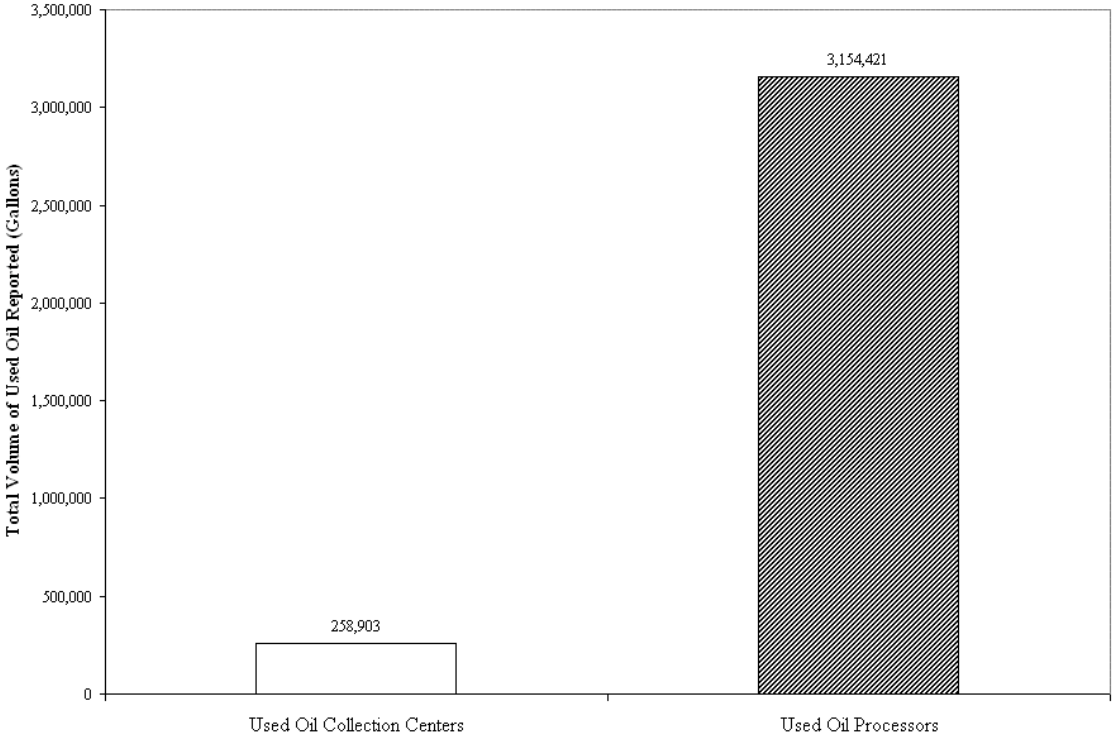
Figure 4.5
Used Oil Volumes Reported to TCEQ by Used Oil Collection Centers



Adapted from: Texas Commission on Environmental Quality, Office of Permitting, Remediation and Registration, Registration and Reporting Section, WWC Crystal Database Report on "Used Oil Collection Centers Reporting." Requested October 5, 2005, returned by TCEQ employee Mansoor Ahmed on October 18, 2005.

There are three used oil processors registered in El Paso County. Each reported the volume of used oil processed in 2003, as required: a total of more than 3.1 million gallons of used oil,[14] more than ten times the total volume of used oil handled by collection centers in 2003, as shown in Figure 4.6. This discrepancy is consistent with totals found statewide. In 2001, TCEQ reported that more than 70 million gallons of used oil were processed statewide, but used oil collection centers handled less than 7 million gallons of used oil in the same time period. The same report notes that such a disparity is expected, since used oil collection centers are intended to collect used oil from small generators, and generators who produce a lot of used oil will send it directly to a processor.[15]

Figure 4.6
Used Oil Volumes Reported to TCEQ for 2003



Adapted from: Texas Commission on Environmental Quality, Office of Permitting, Remediation and Registration, Registration and Reporting Section, WWC Crystal Database Report on "Used Oil Collection Centers Reporting." Requested October 5, 2005; WWC Crystal Database Report on "Used Oil Processors/Re-refiners Reporting." Requested October 5, 2005, returned by TCEQ employee Mansoor Ahmed on November 2, 2005.

Data Storage

The Office of Permitting, Remediation and Registration, Registration and Reporting Section at TCEQ stores all used oil registration information and used oil data from collection centers, processors, and re-refiners in a database that contains record on numerous reporting and permitting programs but is not specific to waste oil. Upon registering with TCEQ, a used oil handler will be issued a registration number that is associated with the location of the facility being registered rather than a specific owner or operation. Within the database, a specific record (e.g., location address or registration number) can be located and viewed immediately by TCEQ personnel, or a query of active registrants can be performed using various identifying criteria, such as a search for all used oil collection centers in El Paso County.

A "Handler Activity Report" is generated within the database every time a facility associated with a given registration number submits either biennial or annual reports to TCEQ. These Handler Activity Reports are found in the database along with the facility's other information and include records of the volumes of used oil volumes reported as collected by a collection center or processed or re-refined by a processor or re-refiner. Data associated with active used oil registrants appear to be accessible to various waste management specialists in the registration and reporting section. Requests for data associated with registration numbers that are inactive must be handled by a Registration and Reporting database specialist. Registration numbers become inactive if a used oil handler has notified TCEQ that their facilities are moving or that they will no longer be involved in the generation or handling of used oil.[16]

The database design is such that the used oil data report returned to the requestor is limited by the requestor's understanding of the information available and how it is organized. As an example, if a user requests "all used oil collection centers registered in 2003 or 2004," the report will list only those used oil collection centers *newly* registered in 2003 or 2004. The original registration date of each registered used oil collection center is stored in the database, but only the registration expiration date (at the end of the two year period) is changed upon re-registration.[17] Used oil collection center annual reports are to identify transporters who pick up shipments of used oil from collection centers; however, that information is not stored in the used oil database and is not easily retrieved or cross-referenced.[18]

Potential Drawbacks to the Existing Used Oil Data Collection System

The existing used oil registration and reporting system does not capture a complete picture of used oil handling activities and eventual used oil disposal in Texas (see Figures 4.1 and 4.3). Although used oil transporters, transfer facilities, processor/re-refiners, and used oil fuel marketers are all required to register with TCEQ, only used oil collection centers and used oil processors/re-refiners are required to report on their used oil handling activity regularly to TCEQ. Used oil legally can bypass either of these steps, and there is no guarantee that tracking used oil at just these points in the used oil lifecycle allows all used oil to be accounted for.

Household generators are not regulated or monitored by the federal or Texas used oil standards unless the household delivers the used oil to a collection center and thereby enters it into the regulated used oil lifecycle. However, neither TCEQ nor other analysts report any estimate of the percentage of oil used by individuals or the fraction of used oil generated by households that enters collection centers. Research conducted by the State of California indicated that more than 15 percent of households in the state were do-it-yourselfers and consume approximately 10 percent of the used oil sold in the state.[19,20] The combination of survey data and sales data led one California research team to estimate that collection centers and curbside collection of used oil could account for less than 30 percent of the used oil consumed by do-it-yourselfers. In contrast, they estimated that more than 40 percent of the used oil generated by do-it-yourselfers was thrown in the trash, poured down drains, or otherwise disposed improperly.[21] The amount of used oil disposed of improperly by household generators may be less than 5 percent of total sales, but the improper disposal of millions of gallons of used oil could clearly be detrimental to water quality in the state.

Other used oil generators are not required to register or report on their used oil handling activities to TCEQ under either federal or Texas used oil standards. As a result, used oil is accounted for only when it reaches a used oil collection center or used oil processing/re-refining facility. More than ten times as much used oil was reportedly processed than was collected at collection centers in 2003; therefore, either collection centers underreport (less likely) or most used oil never goes through a used oil collection center (more likely). Used oil entering collection centers outside of El Paso County may wind up in processing/re-refining facilities within the county, as El Paso is a large urban center with three used oil processing/re-refining facilities.

On the other end of the lifecycle, there are six possible eventual dispositions for used oil (see Figure 4.3). Only the used oil processors report to TCEQ, making it difficult to know how much used oil follows each of the other five paths.

The used oil registration and reporting system does not seem to produce data that portray the volume of used oil generated, handled, or disposed annually. However, the system does require used oil collection centers maintain their registration biennially and report the volume of used oil collected every year. This paperwork burden is substantial given that the used oil processors report handling ten times as much used oil as the used oil collection centers, and it is the used oil collection centers that provide a public service by collecting used oil from household generators.

Conclusions

The existing registration and reporting system in Texas complies with federal used oil regulations. However, the data produced by the system do not allow for complete understanding of the fate of used oil in El Paso County. The data system does not provide assurance that the apparent overall objective of the federal system is being met to minimize the environmental impact from used oil. Chapter 5 provides a review of used oil management in another state, California, as an alternate perspective for Texas.

Notes

[1] Texas Commission on Environmental Quality (TCEQ), "Registration for Used Oil Collection Centers" (Austin, Tex., March 28, 2002).

[2] TCEQ, "Registration for Used Handler and/or Used Oil Filter Handlers" (Austin, Tex., March 28, 2002).

[3] TCEQ Office of Permitting, Remediation and Registration, Registration and Reporting Section, WWC Crystal Database Report on "Registered Used Oil Collection Centers." Requested October 5, 2005, returned by TCEQ employee Mansoor Ahmed on November 1, 2005.

[4] TCEQ, WWC Crystal Database Report on "Registered Used Oil Collection Centers." Requested November 15, 2005, returned by TCEQ employee Mansoor Ahmed on November 28, 2005.

[5] Ibid.

[6] TCEQ, WWC Crystal Database Report on "Registered Used Oil Handlers." Requested November 15, 2005, returned by TCEQ employee Mansoor Ahmed on November 28, 2005.

[7] Ibid.

[8] TCEQ, Central Registry Query—Regulated Entity Search. Online. Available: http://www4.tceq.state.tx.us/crpub/index.cfm?fuseaction=regent.RNSearch&CFID=21869&CFTOKEN=64133499. Accessed: October 4, 2005.

[9] TCEQ, "20__ Annual Reporting Form for Used Oil Collection Centers" (Austin, Tex., January 3, 2002).

[10] TCEQ, "2002/2003 Biennial Reporting Form for Used Oil Processors, Re-Refiners and Filter Handlers," (Austin, Tex., January 3, 2002).

[11] TCEQ, WWC Crystal Database Report on "Used Oil Collection Centers Reporting." Requested October 5, 2005, returned by TCEQ employee Mansoor Ahmed on October 18, 2005.

[12] Ibid.

[13] TCEQ WWC Crystal Database Report on "Used Oil Collection Centers Reporting." Requested November 15, 2005, returned by TCEQ employee Mansoor Ahmed on November 28, 2005.

[14] TCEQ WWC Crystal Database Report on "Used Oil Processors/Re-refiners Reporting." Requested October 5, 2005, returned by TCEQ employee Mansoor Ahmed on November 2, 2005.

[15] TCEQ Registration, Review and Reporting Division, *Used Oil Recycling in Fiscal 2001 and 2002: Report to the 78th Legislature* (Austin, Tex., December 2002). Online. Available: http://www.tceq.state.tx.us/assets/public/comm_exec/pubs/sfr/048_02.pdf. Accessed: December 14, 2005.

[16] Interview by Amanda Van Epps with Elizabeth Granja, Waste Program Specialist/DMAT 2, Registration and Reporting Section, Office of Permitting, Remediation and Registration, TCEQ, Austin, Tex., September 27, 2005.

[17] Telephone interview by Amanda Van Epps with Mansoor Ahmed, Registration and Reporting Section, Office of Permitting, Remediation and Registration, TCEQ, November 1, 2005.

[18] Email from Mansoor Ahmed, Registration and Reporting Section, Office of Permitting, Remediation and Registration, TCEQ, "Re: FW: Used Oil Data," to Amanda Van Epps, November 28, 2005.

[19] California Integrated Waste Management Board (CIWMB), *"To the Greatest Extent Possible": Do-It-Yourselfers and the Recovery of Used Oil and Filters* (Sacramento, Calif., October 2005). Online. Available: http://www.ciwmb.ca.gov/Publications/UsedOil/61105008.pdf. Accessed: January 23, 2006.

[20] CIWMB, *Used Oil Recycling Rate Biannual Report: Fiscal Year 2002-2003*. Online. Available: http://www.ciwmb.ca.gov/UsedOil/RateInfo/Biannual.htm. Accessed: February 20, 2006.

[21] CIWMB, *"To the Greatest Extent Possible": Do-It-Yourselfers and the Recovery of Used Oil and Filters*. Online. Available: http://www.ciwmb.ca.gov/Publications/UsedOil/61105008.pdf. Accessed: January 31, 2006.

Chapter 5. Used Oil Management in California

Within the United States all states must at a minimum implement the federal used oil standards, but each state can also develop its own used oil management program, subject to federal used oil regulations. In comparison to Texas, the State of California has a more comprehensive used oil program, and there are elements of the California program that may be useful for Texas to consider or to emulate. This chapter describes information on the handling of used oil in California and the relevant state laws and regulations, found in the California Health and Safety Code (CHSC), division 20, chapter 6.5, article 13 and in the California Code of Regulations (CCR), title 22, division 4.5, chapter 29, entitled "Standards for the Management of Used Oil," and title 14, division 7, chapter 8, entitled "Used Oil Recycling Program."[1,2,3]

Two different California state agencies are given regulatory oversight for different aspects of the used oil framework: the Department of Toxic Substances Control (DTSC) and the California Integrated Waste Management Board (CIWMB). DTSC is authorized to enforce the California used oil management standards found in the CHSC and title 22 of the CCR. These standards are intended to supplement and clarify the federal used oil standards. For example, used oil generators and collection centers are required to comply with California requirements for hazardous waste generators, a more stringent requirement than those found in the federal regulations.

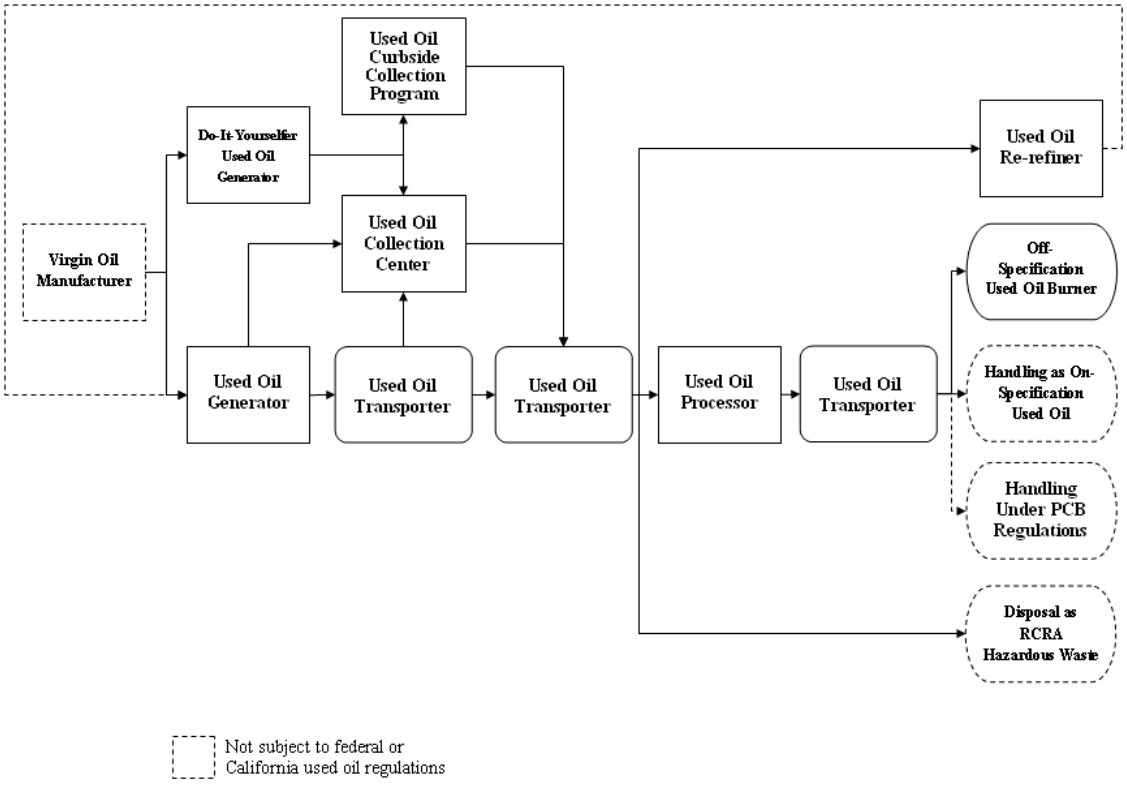
CIWMB, on the other hand, is not tasked with enforcement efforts, but instead administers the "Used Oil Recycling Program" to encourage recycling of used oil. CIWMB manages a recycling incentive fee system that collects money from oil manufacturers for every gallon of virgin oil manufactured and then redistributes that money to certain parties when they arrange for used oil to be recycled. CIWMB also provides grants to local and regional programs that further the mission of proper collection and recycling of used oil. Each of these components is discussed below.

California Standards for the Management of Used Oil

The aim of the regulatory system established by the CHSC and title 22 of the CCR is to achieve the goal set by the California legislature that "used oil…be collected and recycled, to the maximum extent possible, by means which are economically feasible and environmentally sound, in order to conserve irreplaceable petroleum resources, to protect the environment, and to protect public health, safety, and welfare."[4]

These laws and regulations establish a comprehensive system for handling and managing used oil in the state, including storage limitations, a manifest system for tracking used oil shipments at all points, additional requirements for analytical testing for halogens (related to the rebuttable presumption), and greater registration and reporting requirements than those found at the federal level or in Texas. The regulated lifecycle of used oil in California is shown in Figure 5.1.

Figure 5.1
Regulated Used Oil Lifecycle in California



Adapted from: California Code of Regulations (CCR), title 22, division 4.5, chapter 29. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: March 8, 2006; CCR, title 14, division 7, chapter 8. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006; and California Health and Safety Code, division 20, chapter 6.5, article 13. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc. Accessed: March 27, 2006.

One important aspect of the system is the requirement that used oil "be managed as a hazardous waste" from the point of generation to the point at which it is considered recycled oil.[5] "Recycled oil" is defined as used oil that has been recycled by a permitted recycling facility in California or in another state. The recycled oil must meet certain specifications including a minimum flashpoint and maximum concentrations of lead, arsenic, chromium, cadmium, halogens, and polychlorinated biphenyls (PCBs). These specifications cannot be met by blending with crude oil or other hydrocarbon substances. Furthermore, the recycled oil product cannot be mixed with a listed hazardous waste. If the oil has been recycled by a permitted recycling facility in California, it can be hazardous on the basis of one of the constituents for which there is a specification. Recycled oil cannot be characteristically hazardous for anything other than the chemicals for which there are recycled oil product specifications.[6]

California law prohibits the disposal of used oil in a landfill and prohibits burning as fuel within the state;[7] however, used oil that is processed within California is often used as marine diesel oil in ships outside of the state.[8,9] Burning is a practice allowed in Texas.

The law also requires that any used oil containers manufactured and sold to the public not absorb used oil contained in them and not leak or spill in the course of normal use. Containers must include a statement reminding users that used oil is a hazardous waste in California and may not be put into the garbage or dumped on land.[10]

The system established by the CHSC and CCR regulates three primary groups: used oil generators, used oil transporters, and used oil processors/re-refiners. As a result of the ban on burning of used oil, some categories regulated at the federal level (such as burners of off-specification used oil and used oil fuel marketers) are not addressed directly in California law and regulations.

California Used Oil Standards for Generators and Collection Centers

In most circumstances, used oil generators and collection centers in California must comply with regulations for hazardous waste generators.[11,12] The resulting requirements are summarized in Table 5.1 and Table 5.2. Table 5.3 outlines additional requirements for curbside used oil collection programs, one particular kind of generator for which there are a small number of specific regulations in addition to those for generators.

Table 5.1
California Standards for Used Oil Generators

Category	Requirements
Registration	Must obtain an identification number from DTSC.
Used oil storage	• May store up to 90 days without complying with hazardous waste storage facility regulations. • Used oil storage containers must be marked as "Used Oil" and "Hazardous Waste," along with the date accumulation began, any hazardous properties of the oil, and the name and address of the generator.
Rebuttable presumption for used oil	• Required to establish the halogen content of the generated used oil. • Halogen content can be established either by analytical testing or by knowledge of the halogen content of unused oil, halogen content that would have been added through use, and halogen content that would have been added by contact with other halogen-containing materials or chemicals. • Used oil that is found to contain more than 1,000 parts per million (ppm) of halogens but was generated exclusively by household generators or by Conditionally Exempt Small Quantity Generators is not presumed to have been mixed with a hazardous waste and does not have to be handled as one.

Category	Requirements
Off-site shipment of used oil	• Generator may transport up to 55 gallons of their own oil at a time without being considered a hazardous waste transporter. If more than 20 gallons are transported at one time or oil is transported in containers larger than 5 gallons, the generator must contact the collection center to verify that the used oil will be accepted by the center. • Must use a transporter with an EPA identification number to ship used oil off-site. • Must be accompanied by a DTSC waste manifest. • Generator must maintain a copy of the waste manifest and send a copy to DTSC within 30 days. • If generator ships used oil directly to a processor/re-refiner, generator must give the transporter a certification that the used oil meets the conditions of used oil, but does not contain more than 5 ppm of PCBs. • Must ensure that the shipment complies with United States Department of Transportation (DOT) regulations for packaging and shipping found in the Code of Federal Regulations (CFR), title 49, parts 172, 173, 178, and 179. • If generator collects used oil in the course of maintaining vehicles of others, the used oil is not considered generated until it is consolidated with other used oil at the generator's business. Generator must transport no more than 55 gallons of the used oil to that place of business.
Reporting	Large quantity generators (more than 1,000 kilograms of hazardous waste generated in any month) must report to DTSC by March 1 of every even-numbered year. Report should include the volume of used oil generated in the previous two-year period, the names and identification numbers of the facilities to which the used oil was shipped, and any efforts to reduce the amount of waste generated.
Recordkeeping	• Required to keep copies of all manifests for three years. • Must maintain records of the information used to establish the halogen concentration for three years.
Recycling Fee Incentive System Requirements for Industrial Generators	• Industrial generators may choose to register with the CIWMB to be paid the recycling incentive. Only certain businesses that do not have the general public as customers may register as an industrial generator. Registration must include the name of address of the facility where the used oil is generated and the business in which the used oil is produced. • Registered industrial generators will receive a registration number from the CIWMB, and the CIWMB may inspect these registered entities. • Registered industrial generators are required to maintain manifests for all shipments of used oil sent to a used oil processor/re-refiner as well as receipts for purchases of used oil indicating that the recycling incentive fee on those purchases was paid to the state. • To receive the recycling incentive, industrial generators must report to the CIWMB quarterly on the amount of new lubricating oil that the center purchased in that quarter (with evidence that the recycling incentive fee had been paid) and the volume of used oil that the center shipped to a used oil processor/re-refiner with manifests for these shipments.

Adapted from: California Code of Regulations (CCR), title 14, division 7, chapter 8. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006; CCR, title 22, division 4.5, chapters 12, 29. Online. Available: http://government.westlaw. comlinkedslice/default.asp?SP=CCR-1000. Accessed: March 9, 2006; and California Health and Safety Code, division 20, chapter 6.5, article 13. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc. Accessed: March 27, 2006.

Table 5.2
California Standards for Used Oil Collection Centers

Category	Requirements
Registration	• Must obtain an identification number from DTSC. • Do not have to be permitted as hazardous waste facilities if they do not collect used oil more than 55 gallons at a time from the generators themselves and do not collect other hazardous wastes at the location.
Used oil storage	• May store up to 90 days without complying with hazardous waste storage facility regulations. • Used oil storage containers must be marked as "Used Oil" and "Hazardous Waste," along with the date accumulation began, any hazardous properties of the oil, and the name and address of the generator.
Rebuttable presumption for used oil	• Required to establish the halogen content of the generated used oil. • Halogen content can be established either by analytical testing or by knowledge of the halogen content. If knowledge is used instead of analytical testing, collection center may either accept a certification that the generator has determined the halogen content to be less than 1,000 ppm, or they may perform their own analysis that considers the halogen content of unused oil, halogen content that would have been added through use, and halogen content that would have been added by contact with other halogen-containing materials or chemicals. • Used oil that is found to contain more than 1,000 ppm of halogens but was generated exclusively by household generators or by Conditionally Exempt Small Quantity Generators is not presumed to have been mixed with a hazardous waste and does not have to be handled as one.
Off-site shipment of used oil	• Must use a transporter with an EPA identification number to ship used oil off-site. • Must be accompanied by a DTSC waste manifest. • Collection center must maintain a copy of the waste manifest and send a copy to DTSC within 30 days. • Must ensure that the shipment complies with DOT regulations for packaging and shipping found in the CFR, title 49, parts 172, 173, 178, and 179. • Must notify DTSC prior to exporting used oil to a foreign country
Reporting	• None required.
Record-keeping	• Required to keep copies of all manifests for three years. • Must maintain records of the information used to establish the halogen concentration for three years.
Recycling Fee Incentive System Requirements	• May choose to apply for certification. Application for certification must include the name and address of the collection center, the identity of the operator, the date on which used oil will begin to be accepted from the general public, the days and hours during which the collection center will operate, and the amount of used oil that can be stored at the facility. The collection center must also divulge if the owner or operator also serves as a used oil transporter or processor/re-refiner. The certification applies only to a specific facility and operator, and every used oil collection centers must be recertified every two years. • Certified centers are required to accept used oil from the public and offer to pay the person delivering the used oil the $0.16 per gallon that the collection center will receive for the oil. Certified centers are required to accept at least five gallons from each person per day, but may not accept any more than 55 gallons per person in one day and may not accept oil in containers larger than 55 gallons. • If a certified collection center accepts oil from industrial generators, a record of the date and volume of each collection of used industrial oil must be maintained. • If a certified collection center owner or operator also serves as a used oil transporter or processor/re-refiner, then all oil collected must be documented, including the date, volume, name of person delivering the oil, the fee paid to the person, and

Category	Requirements
	whether the oil is used lubricating oil or used industrial oil. Each of these logs must be maintained for three years. • Certified collection centers must maintain manifests for all shipments of used oil sent to processors/re-refiners and receipts of any new oil purchased indicating that the recycling incentive fee was paid to the state. • Certified used oil collection centers are required to advertise to the public at least once every six months, including the name and location of the center as well as the hours of operation and the fact that the person bringing the oil can be paid for it. When a collection center applies for recertification every two years, it must demonstrate that it has fulfilled the advertising requirement. • Certified collection centers must have a plan to prevent the acceptance of used oil contaminated with other wastes. • Certified collection centers operated by used oil transporters or processors/re-refiners are not allowed to accept more than 10 percent of used oil anonymously. • To receive the recycling incentive, a certified collection center must report to the CIWMB quarterly both on the amount of new lubricating oil that the center purchased in that quarter (with evidence that the recycling incentive fee had been paid) as well as the amount of used oil that the center shipped to a used oil processor/re-refiner with manifests for these shipments. Used oil collection centers are paid only for used oil delivered by household do-it-yourselfers or generated by the center itself.

Adapted from: California Code of Regulations (CCR), title 14, division 7, chapter 8, article 6.0.; CCR, title 22, division 4.5, chapters 12, 29; and California Health and Safety Code, division 20, chapter 6.5, article 13.

Table 5.3
California Standards for Used Oil Curbside Collection Programs

Category	Requirements
Registration	Must comply with standards for used oil generators, but do not have to pay the fee required of all other hazardous waste generators.
Used oil transportation	• Not required to prepare manifests for transport of the used oil collected. • Used oil is not considered generated until it has reached a storage facility.
Recycling Fee Incentive System Requirements	• May choose to register with the CIWMB in order to be paid the recycling incentive. Registration must include the name and address of the operator as well as details of their service, such as the area served and the days of collection. The application must divulge if the owner or operator also serves as a used oil transporter or processor/re-refiner. • Each registered curbside collection program will receive a registration number from the CIWMB, and the CIWMB may inspect these registered entities. • Registered curbside collection programs are required to maintain manifests for all shipments of used oil sent to a used oil processor/re-refiner. • To receive the recycling incentive, curbside collection programs must report to the CIWMB quarterly the volume of used oil that the center shipped to a used oil processor/re-refiner with manifests for these shipments.

Adapted from: California Code of Regulations, title 14, division 7, chapter 8. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006; and California Health and Safety Code, division 20, chapter 6.5, article 13, section 25250.15. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc. Accessed: March 27, 2006.

There are limited circumstances under which a used oil generator may claim that their used oil is not subject to these standards or handling as a hazardous waste. To be exempt, a used oil must meet the purity specifications for recycled oil without treatment. Furthermore, the used oil may not be mixed with a listed hazardous waste or itself be a characteristic waste for any constituent other than those listed in the purity specifications. Disposal of the used oil is still prohibited.[13] The exemption is based on the results of analytical testing performed to demonstrate compliance with the California specifications and to test for hazardous characteristics and constituents. DTSC must also be notified in writing.[14,15] Generators claiming this exemption must include a certification form with each shipment of used oil that includes their name and address as well as the facility to which the used oil is going, the volume of oil included, and the date of the shipment.[16] Copies of these certification forms as well as analytical test results performed for all used oil shipments that the generator believes exempt from these standards must be maintained in an operating log for three years.[17]

California Used Oil Standards for Transporters and Processors/Re-Refiners

Used oil transporters are referred to as "haulers" throughout these regulations.[18] Important among the regulations is that used oil transporters must be registered with DTSC as hazardous waste haulers, again requiring a greater level of regulation than is required by the federal standards or those in place in Texas. Specific regulations governing used oil handling by transporters and transfer facilities are listed in Table 5.4.

Table 5.4
California Standards for Used Oil Transporters and Transfer Facilities

Category	Requirements
Registration	• Must register with DTSC as a hazardous waste transporter and obtain an identification number.
Used oil transportation	• Must be accompanied by a DTSC waste manifest. • Required to provide each generator from whom they receive a shipment of used oil with notification that the used oil may be transported to an out-of-state used oil recycling facility that may not comply with California used oil standards, a process permissible by law. Must provide this notification annually unless the generator designates a specific DTSC-authorized recycling facility or the transporter certifies in writing that the used oil will only be transported to DTSC-authorized recycling facilities.

Category	Requirements
	• If recycled oil or oil that the generator has asserted is exempt from regulation as used oil is transported, the transporter must keep a certification form with the shipment that identifies the name and address of either the recycling facility or the generator with whom the oil originated; the facility to which the oil will be delivered; the volume of used oil in the shipment; and the shipment date.
Rebuttable presumption for used oil	• Transporters must use either analytical results or knowledge to determine the halogen content of used oil shipments. If the transporter elects to use knowledge instead of analytical testing, they may either accept a certification that the generator has determined the halogen content to be less than 1,000 ppm, or they may perform their own analysis that considers the halogen content of unused oil, halogen content that would have been added through use, and halogen content that would have been added by contact with other halogen-containing materials or chemicals. • Transfer facilities must determine the halogen content of used oil through analytical testing • Used oil that is found to contain more than 1,000 ppm of halogens but was generated exclusively by household generators or by Conditionally Exempt Small Quantity Generators is not presumed to have been mixed with a hazardous waste and does not have to be handled as one.
Reporting	• Transporters are required to report annually by March 1 on the volume of used oil transported in the preceding year and the facilities to which the used oil was transported. • Transfer facilities are required to report by March 1 of every even-numbered year the volume of used oil at the facility at the beginning and end of the preceding year and the volumes of used oil received and shipped elsewhere without recycling.
Recordkeeping	• Required to maintain copies of all manifests for three years. • Copies of certification forms associated with the transport of recycled or exempt used oil must be maintained for three years.
Recycling Fee Incentive System Requirements	• When transporters deliver the shipment to a transfer facility or recycling facility, they must provide information about the volume of lubricating oil and industrial oil in the shipment. • Required to report to the CIWMB quarterly on the volume of used oil transported in the preceding quarter, including the volume of lubricating oil transported and the volume of industrial oil collected from each of the following generator categories: used oil collection centers, industrial generators, marine generators, agricultural generators, government entities, sources outside the state, or other kinds of generators. The facilities to which the shipments were delivered must also be included in these quarterly reports.

Adapted from: California Code of Regulations (CCR), title 14, division 7, chapter 8. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006; CCR, title 22, division 4.5, chapter 12, article 2, and chapter 29, article 2, section 66279.10. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: March 9, 2006; and California Health and Safety Code, division 20, chapter 6.5, article 13. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc. Accessed: March 27, 2006.

Used oil processors/re-refiners are referred to as "recycling facilit[ies]"throughout these standards.[19] One requirement of the used oil processors/re-refiners is that all used oil must be tested after treatment to verify compliance with the purity specifications

discussed previously. The specific standards for used oil processors/re-refiners are summarized in Table 5.5.

Table 5.5
California Standards for Used Oil Processors and Re-Refiners

Category	Requirements
Registration	Must obtain an identification number from DTSC.
Rebuttable presumption for used oil	• Must establish the halogen content of used oil through analytical testing. • Used oil that is found to contain more than 1,000 ppm of halogens but was generated exclusively by household generators or by Conditionally Exempt Small Quantity Generators is not presumed to have been mixed with a hazardous waste and does not have to be handled as one.
Recycled oil	Required to test all oil before it leaves the facility to demonstrate that the recycled oil complies with the purity specifications as well as any other requirements of the facility permit.
Reporting	Required to report to DTSC by March 1 of every even-numbered year the volume of used oil at the facility at the beginning and end of the preceding year and the volumes of used oil received and recycled during the preceding year. Specific volumes must also be given for the volumes recycled for reuse as a petroleum product and volumes recycled for other uses, volume consumed in the recycling process, volume of used oil shipped elsewhere without recycling, and the processes used to process or re-refine the used oil.
Recordkeeping	• Must maintain a record of volumes and characteristics of all used oil that is received and information about the technology used to recycle the oil. • Must maintain an operating log with information on each shipment of recycled oil that includes the volume of recycled oil, the destination of the oil, and the date of the shipment. • These records along with information regarding analytical testing for compliance with the purity specifications and facility permits must be maintained for three years.
Recycling Fee Incentive System Requirements	• May choose to apply for certification from the CIWMB. Certification applies only to a specific facility and operator, and certified facilities are inspected annually. • Required to document the amount of used lubricating oil and used industrial oil that they receive in every shipment. • Must also track the volume of oil that they produce in each of five categories: oil re-refined as motor oil; oil re-refined to be industrial oil; oil processed into fuel oil; oil processed into asphalt; and oil consumed in the recycling process as well as volume of oil shipped to other facilities and the volume of byproducts produced. • Must report to CIWMB quarterly the volumes of oil received, produced, and transferred.

Adapted from: California Code of Regulations (CCR), title 14, division 7, chapter 8, article 5. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006; CCR, title 22, division 4.5, chapter 12, article 1, section 66262.12 and chapter 29, article 2, section 66279.10. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP= CCR-1000. Accessed: March 9, 2006; and California Health and Safety Code, division 20, chapter 6.5,

article 13. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc. Accessed: March 27, 2006.

The intent of the California used oil management standards is comparable to federal standards and Texas standards, in that all are trying to mitigate the environmental impact from improper disposal of used oil. The California regulations are more stringent in the requirement that used oil generators and collection centers comply with requirements for hazardous waste generators and that used oil transporters be registered as hazardous waste transporters. However, the California Used Oil Recycling Program has many unique elements not common to the other programs.

California Used Oil Recycling Program

The CIWMB is responsible for administering a used oil recycling program that includes a recycling incentive fee system and a used oil grant program. Approximately 20 CIWMB employees focus on used oil,[20] and the program aims to educate the public of the importance of recycling used oil, ensure that it is convenient to do so, and develop the market for oil once it has been processed or re-refined.[21]

Recycling Incentive Fee System

The California recycling incentive fee system requires any oil manufacturer to pay the state $0.16 per gallon of oil sold in the state. When oil is taken to a "recycling" facility (i.e., a used oil processor/re-refiner), California pays $0.16 per gallon as a motivation to recycle the oil. Many types of firms can receive the recycling fee, including certified used oil collection centers, registered industrial generators, and curbside collection programs, if they arrange for delivery of used oil to a recycling facility. Electric utilities that take advantage of an exception to the ban on burning of used oil[22] and burn their own used oil to generate electricity may also receive the recycling incentive.[23]

Oil manufacturers must track the amount of lubricating oil that is sold in California every month as a part of the recycling incentive fee system. The fee system does not cover industrial oils, such as hydraulic fluid, because it is not generally replaced nearly as frequently as motor oil, so was deemed to pose less of a threat to the environment when these regulations were written.[24] The manufacturer must report the amount of lubricating oil to the CIWMB quarterly and pay $0.16 per gallon sold in that quarter.[25,26] CIWMB staff reports that the program collects approximately $20 million annually.[27] In contrast, only approximately $3.4 million is paid out to those who recycle used oil.[28,29]

Used oil collection centers may also choose to apply for certification in order to collect the recycling incentive from the state.[30] Used oil collection centers are paid only for used oil delivered by household do-it-yourselfers or generated by the center itself. Certified used oil collection centers are required to accept used oil from the public and offer to pay the $0.16 per gallon that the collection center will receive for the oil;[31] this payment to

the public is not commonly taken advantage of, according to CIWMB staff.[32] Certified used oil collection centers are required to advertise to the public at least once every six months in an effort to increase public awareness of their disposal options.[33]

Industrial generators of used oil, curbside used oil collection programs, and electric utilities that burn used oil for energy must register with the CIWMB in order to be paid the recycling incentive.[34] Only certain businesses that do not have the general public as customers may register as an industrial generator. Examples of registered industrial generators include farms, ranches, construction companies, and rental companies. According to one state staff member, no electric utility in California is active in the recycling incentive fee system.[35]

The recycling incentive can only be paid to a generator or collection center if the used oil is transported to a certified processor/re-refiner, so processor/re-refiners may choose to apply for certification from the CIWMB. In addition, used industrial oil is required to be transported to a certified facility.[36]

Certified used oil collection centers, registered curbside collection programs, and registered industrial generators can then report to CIWMB the volume of used oil that they have shipped to certified used oil processors or re-refiners and receive $0.16 per gallon for that oil. Similarly, electric utilities may receive $0.16 per gallon when the amount of oil used to generate electricity is reported to CIWMB.

Specific requirements associated with the recycling incentive fee system are included in the last row of Tables 5.1 through 5.6. Aside from used oil manufacturers, participation in the recycling incentive fee system is voluntary, but is intended to act as an inducement for individuals and businesses to collect their used oil properly and arrange for its transport to an appropriate processing or re-refining facility. A substantial amount of used oil data is generated as a result of the reporting requirements of the program, and CIWMB uses these data to guide their used oil recycling efforts.

Table 5.6
California Used Oil Standards for Electricity Generation

Category	Requirements
Recycling Fee Incentive System Requirements	• May choose to register with the CIWMB in order to be paid the recycling incentive. Registration must include the business name and facility at which the used oil will be burned for electricity generation. • Each registered industrial electric utility will receive a registration number from the CIWMB, and the CIWMB may inspect these registered entities. • Registered electric utilities must keep copies of receipts for purchases of used oil indicating that the recycling incentive fee on those purchases was paid to the state and maintain records of days on which used oil was used to generate electricity and the amount of oil used in that manner. • To receive the recycling incentive, they must report to the CIWMB quarterly on the amount of new lubricating oil that the center purchased in that quarter (with evidence that the recycling incentive fee had been paid) and the volume of used oil burned for electricity generation.

Adapted from: California Code of Regulations, title 14, division 7, chapter 8. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006.

Used Oil Grant Programs

The CIWMB also administers the California Used Oil Recycling Fund, from which they make grants to used oil recycling projects. Like the recycling incentive fee system, this program is an additional effort to improve collection of used oil and encourage its recycling. Four kinds of grants are made from the fund: block grants, opportunity grants, non-profit grants, and research, testing, and demonstration grants.[37] These programs are discussed below.

Block grants are distributed to municipalities either to provide monthly curbside collection of used oil or to increase the density of used oil collection centers; the state's intent is that one collection center should be available to serve every 100,000 people. Approximately $10 million is distributed in block grants annually; grants are given to approximately 96 percent of the incorporated cities and counties in California.[38] These programs are expected to include a public outreach component that will help educate the public about options for disposing of their used oil.[39] The size of a block grant is determined based on the number of state residents who will be served by the program, multiplied by a per capita rate; the rate is set by the total funds available for block grants divided by total California population).[40] Municipalities receiving such block grants are required to report annually to the CIWMB including a description of the implemented program, the volume of used oil collected by the program, and the public outreach performed, as required for the grant.[41] Opportunity grants are also provided to local governments, but are awarded competitively. The opportunity grants are expected to supplement awarded Block Grants and help build on programs funded or started with a Block Grant.[42]

Non-profit organizations are eligible to apply for the non-profit grants distributed by the CIWMB in order to establish or expand programs that offer or encourage alternatives to illegal disposal of used oil. In the most recent funding cycle (for fiscal year 2004-2005), grants of up to $200,000 were available for distribution.[43] CIWMB priorities in funding projects included: (a) increased collection of used oil filters at sales locations, such as auto parts stores; (b) education and outreach to recent immigrants on proper disposal of used oil and used oil filters; (c) collection of marina oil, oil filters, and bilge pads; and (d) outreach to small businesses who are not required to comply with regulations as generators because they are considered Conditionally Exempt Small Quantity Generators.[44]

Research, testing, and demonstration grants can be awarded to either municipalities or non-profit organizations, but are broader in purpose. These grants can support projects to improve the collection of used oil, but they may also focus on the recycling of used oil or reuse of that oil once it has been recycled. In the most recent funding cycle (also fiscal year 2004-2005), the maximum grant amount was $200,000 for projects that focused only on the public education and used oil collection steps (not recycling or reuse) and were only for a single municipality. Projects that focused on improved technologies or were applicable to more than one local municipality could be funded up to $300,000. Priorities established by the CIWMB for that year included outreach to recent immigrants on the proper disposal of used oil and oil filters; reduction of oil use; products that could be used from recycled used oil and oil filters; and collection of used oil and oil filters from agricultural generators.[45]

Summary of Registration and Reporting Requirements

Registration and reporting requirements in the State of California are more stringent than those in the federal regulations and require coordination of efforts between the DTSC and CIWMB.

Registration

Registration requirements in California are summarized in Table 5.7 and shown on Figures 5.2 and 5.3. All used oil handlers, including generators, must be registered with DTSC in order to have the required identification number (shown in gray on Figure 5.2). Industrial generators, curbside collection programs, and electric utilities that burn used oil for electricity generation must register once with the CIWMB before they can be paid the recycling incentive fee. Used oil collection centers may opt to be certified every two years in order to collect the recycling incentive fee. However, CIWMB staff estimate that perhaps only one-quarter of all used oil collection centers are registered because collection centers do not want to fill out required paperwork or do not want additional governmental oversight, even though they could be paid for the work they are already doing.[46,47] Processors/re-refiners may elect to be certified annually by the CIWMB because generators and others can only be paid the recycling incentive if the used oil is eventually taken to a certified processor/re-refiner. Those entities whose optional

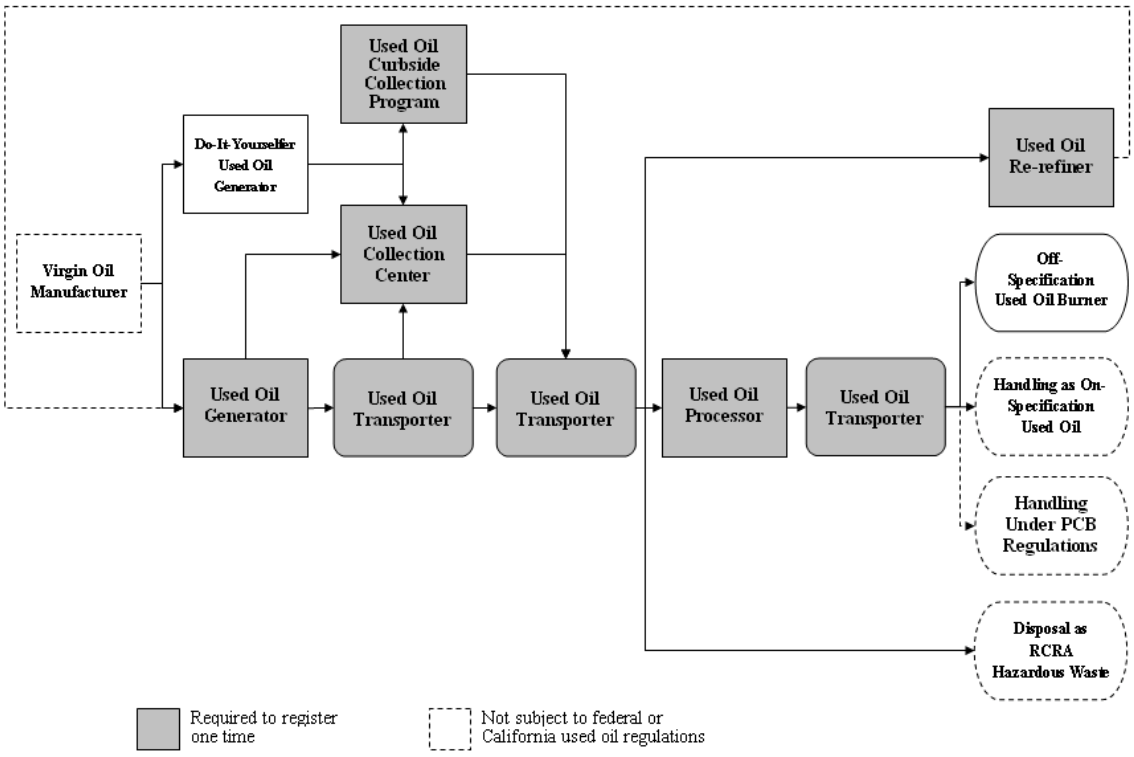
registration is one-time are shown in gray on Figure 5.3 while those entities that must be recertified regularly are shown in black.

Table 5.7
Frequency of Required Registration with State of California

Category	Registration Requirement
Household "do-it-yourselfer" used oil generator	None
Industrial used oil generator	• One-time registration with DTSC • Optional registration with CIWMB
Used oil collection center or aggregation point	• One-time registration with DTSC • Optional biennial certification with CIWMB
Used oil transporter	One-time registration with DTSC
Used oil processor or re-refiner	• One-time registration with DTSC • Optional biennial certification with CIWMB
Curbside used oil collection program	• One-time registration with DTSC • Optional registration with CIWMB
Electric utility that burns used oil for electricity generation	• One-time registration with DTSC • Optional registration with CIWMB

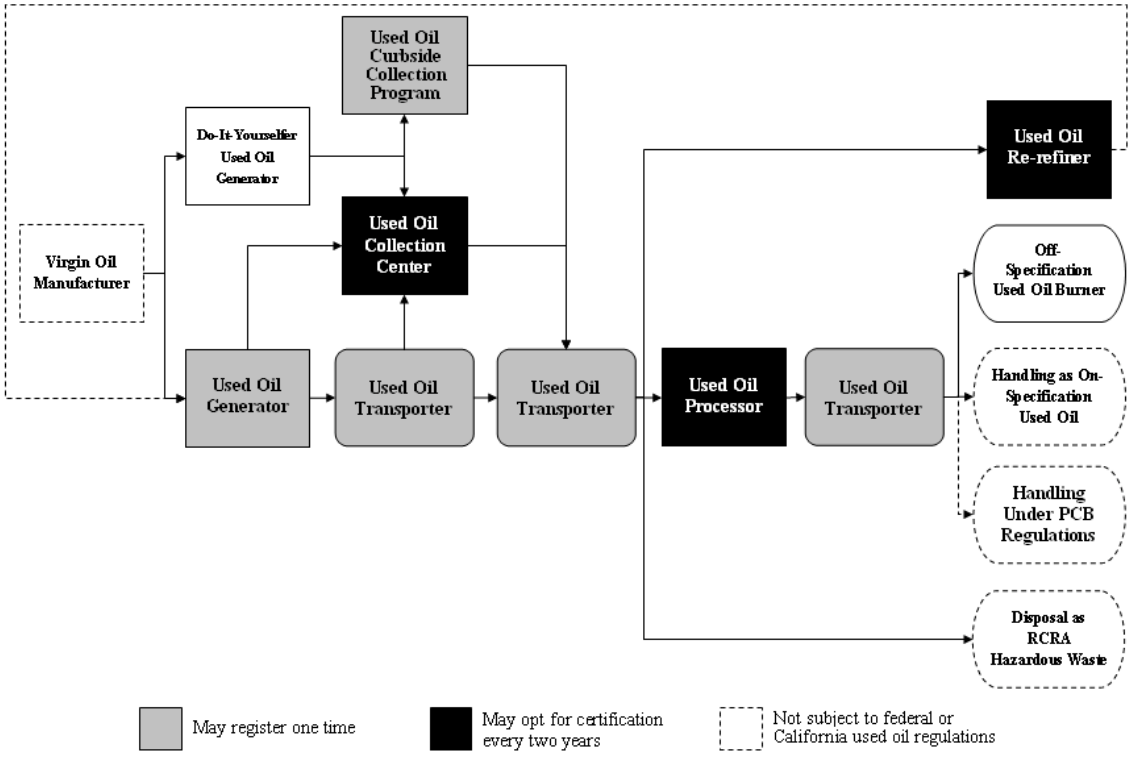
Adapted from: California Code of Regulations (CCR), title 22, division 4.5, chapter 29. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: March 8, 2006; CCR, title 14, division 7, chapter 8. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006; and California Health and Safety Code, division 20, chapter 6.5, article 13. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc. Accessed: March 27, 2006.

Figure 5.2
Summary of Required Registration with California DTSC



Adapted from: California Code of Regulations, title 22, division 4.5, chapter 29. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: March 8, 2006; and California Health and Safety Code, division 20, chapter 6.5, article 13. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc. Accessed: March 27, 2006.

Figure 5.3
Optional Registration or Certification in California



Adapted from: California Code of Regulations, title 14, division 7, chapter 8. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006.

Reporting

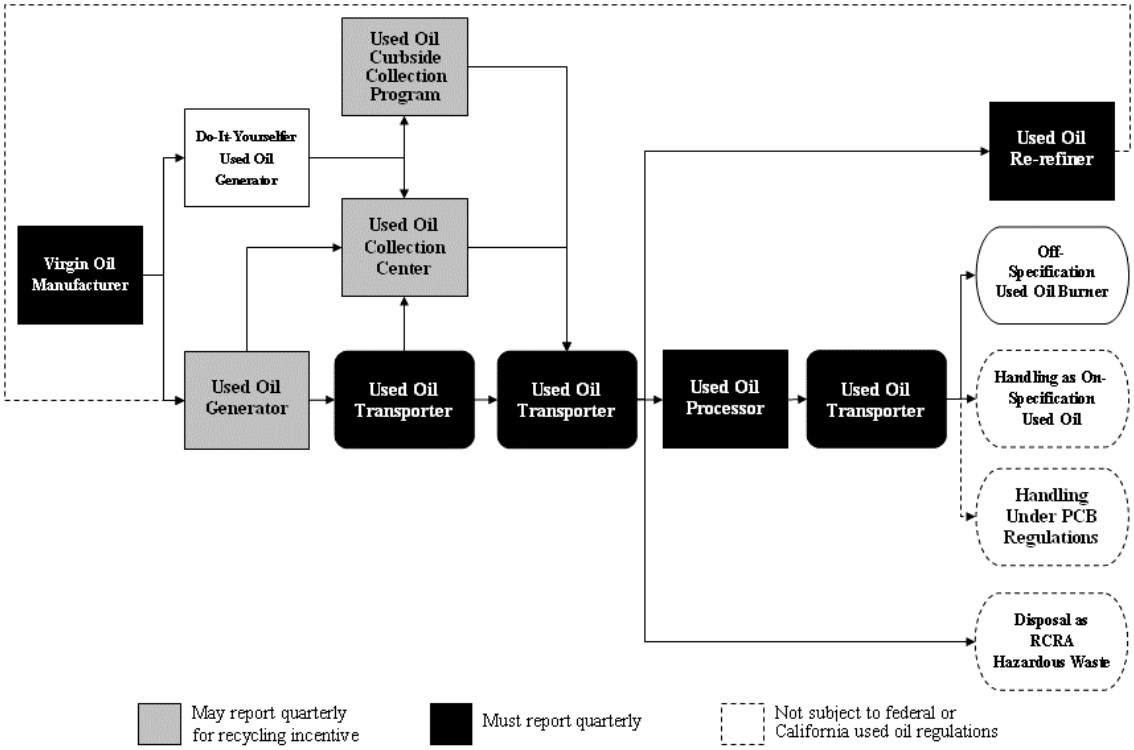
Reporting requirements also vary among the various used oil handlers as shown in Table 5.8 and on Figure 5.4. Used oil generators must comply with the regulations for generators of hazardous waste and therefore report the volume of used oil generated biennially to DTSC. Used oil transporters are required to report annually by March 1st on the volume of used oil transported in the preceding year and the facilities to which the used oil were transported.[48] State law specifies that the reports be made to DTSC; however, DTSC made a policy decision in the mid-1990s to combine annual used oil reporting requirements with quarter reports to the CIWMB. This decision was made to avoid duplicative data collection efforts and to minimize the reporting burden on used oil handlers. Therefore, CIWMB currently collects the data.[49,50]

Table 5.8
Frequency of Required Reporting to the State of California

Category	Registration Requirement
Manufacturers of virgin oil	Quarterly to CIWMB
Household "do-it-yourselfer" used oil generator	None
Industrial used oil generator	• Biennially to CIWMB • Quarterly to CIWMB to receive recycling incentive
Used oil collection center or aggregation point	Quarterly to CIWMB to receive recycling incentive
Curbside used oil collection program	Quarterly to CIWMB to receive recycling incentive
Used oil transporter	Quarterly to CIWMB
Used oil processor or re-refiner	Quarterly to CIWMB
Burner of off-specification used oil	None
Electric utility that burns used oil for electricity generation	Quarterly to CIWMB to receive recycling incentive
Used oil fuel marketer	None

Adapted from: California Code of Regulations (CCR), title 22, division 4.5, chapter 29. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: March 8, 2006; CCR, title 14, division 7, chapter 8. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006; and California Health and Safety Code, division 20, chapter 6.5, article 13. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc. Accessed: March 27, 2006.

Figure 5.4
Reporting Requirements in California



Adapted from: California Code of Regulations (CCR), title 22, division 4.5, chapter 29. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: March 8, 2006; CCR, title 14, division 7, chapter 8. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006; and California Health and Safety Code, division 20, chapter 6.5, article 13. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc. Accessed: March 27, 2006.

California law requires that used oil processors/re-refiners as well as transfer facilities and storage facilities report to DTSC by March 1st of every even-numbered year the volume of used oil at the facility at the beginning and end of the preceding year and the volumes of used oil received and recycled during the preceding year. Specific volumes also must be specified for: (a) the volumes recycled for reuse as a petroleum product; (b) amounts recycled for other uses; (c) the oil consumed in the recycling process; (d) the volume of used oil shipped elsewhere without recycling; as well as (e) the processes used to process or re-refine the used oil.[51] Again, DTSC made a policy decision to coordinate data collection efforts with the CIWMB and not require additional reporting by

processors/re-refiners beyond quarterly reporting to the CIWMB that is already performed as described below.[52,53]

Used oil processors and re-refiners have to account for the volumes of lubricating and industrial oil received, the volumes of used oil received from within California and from elsewhere, the total volume of recycled oil produced at the facility, the volume of used oil shipped to other facilities, the names and United States Environmental Protection Agency (EPA) identification numbers of those facilities, as well as the total volume of residual material produced in the processing or re-refining process. Used oil collection centers, industrial generators, and curbside collection programs must report quarterly to the CIWMB on the volume of new lubricating oil purchased in that quarter (with evidence of payment of the recycling incentive fee), as well as the volume of used oil transported to a certified processor/re-refiner (with manifests for these shipments). Electric utilities must report quarterly to the CIWMB on the volume of new lubricating oil purchased in that quarter (with evidence of payment of the recycling incentive fee) as well as the volume of used oil burned for electricity generation. Those entities whose reporting is optional are shown in gray on Figure 5.4 while those entities who must report quarterly are shown in black.

Other reporting requirements are associated with the recycling incentive fee. For example, manufacturers of virgin oil must report the volume of oil sold in California to CIWMB quarterly and pay $0.16 per gallon sold. These data are stored in the California Oil Fee and Refund Tracking System database at CIWMB. All data associated with payouts of the recycling incentive are stored in the Used Oil Recycling System database at CIWMB.[54,55] Used oil transporters and transfer facilities must report to CIWMB quarterly on the volumes of lubricating and industrial oil transported from collection centers, industrial generators, marine generators, agricultural generators, governmental organizations, out-of-state entities, and other generators, as well as the facilities to which this used oil was delivered.

Currently, CIWMB collects and stores all used oil data to avoid duplication of efforts in the state.[56] Since much of the data collected for the recycling fee incentive system are reported only if the generator or handler opts to collect the fee, it is still difficult to account for all used oil at each step of its lifecycle. However, because used oil transporters are required to report to quarterly on the volume of used oil transported to processing/re-refining facilities, and oil manufacturers are required to report on the volume of virgin oil sold in the state, CIWMB is able to estimate the percentage of used oil that is processed or re-refined quarterly.[57] Since 2000, the fraction of lubricating oil sold that has been collected and recycled has varied between 49 and 58 percent.[58] Assuming that 31 to 43 percent of oil are believed to be burned and lost in engine use,[59] these estimates indicate that between 80 and 100 percent of the used oil that remains after use is being collected and recycled.

Furthermore, in recent years, grantees have been required to report to CIWMB on the volume of used oil collected in their programs.[60] These data allow CIWMB staff to track an approximate diversion rate: the percentage of household used oil that could potentially

be collected that is currently being collected through these programs at the city and county level. This effort is fairly new and requires substantial approximations of the amount of used oil that is lost during use, the amount of used oil that individuals generate per capita, and the frequency of household do-it-yourselfer generators. The objective is to allow CIWMB to track over time the improvement in collection of household used oil that is collected as a result of the programs they fund.

Conclusions

California has been developing its used oil program since the 1970s, and has deployed resources and personnel in two different state agencies on the issue. There are several requirements that are substantially more stringent than those currently enacted in Texas. Used oil is regulated as a hazardous waste in California, and the burning of used oil (other than by electric utilities) is not allowed within the state. All used oil generators are required to be registered with DTSC and have an EPA identification number. Used oil manufacturers are required to report to CIWMB quarterly on the volume of used oil sold in the state. This payment serves two important purposes. Combining these data with quarterly data required of used oil transporters or used oil processors/re-refiners, the CIWMB can estimate the percentage of used oil that is being processed or re-refined on a quarterly basis and thereby track any progress made in this area. More than $3 million of the money collected from manufacturers is paid out annually as an incentive to used oil collection centers, curbside collection programs, and industrial generators to ensure that their used oil is recycled properly. This money funds approximately 250 local grants to encourage greater collection of household used oil and used oil filters to target an area that CIWMB recognizes as needing additional attention.

California is in many respects an exemplary model for any state regulating used oil. The recycling incentive fee system provides funding for an extensive program that has been in existence for several decades. State staff report their perception that the "average" California consumer may be more environmentally conscious than in much of the U.S. A large fraction of used oil is collected and taken to the appropriate facilities. Despite all of these advantages, one substantial challenge remains: recent estimates indicate that only 12 percent of used oil collected in California is re-refined. The majority of used oil is blended and sold for used as a fuel outside of the state or distilled for use as marine diesel oil fuel.[61]

Some industry experts claim that the low percentage of used oil in California is due to re-refiner's lobbying efforts to ensure they are the only re-refiner.[62] These two companies process almost all of the waste oil in the state and have drafted Assembly Bill 1195 to prevent waste oil from being shipped out of state because processors in other states pay generators for waste oil whereas California re-refiners do not.[63] The monopolistic structure of this industry may inhibit re-refining. The following two chapters examine further the technical means available for processing and re-refining used oil and help identify the challenges associated with encouraging further treatment and recycling of used oil.

Notes

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[2] California Code of Regulations (CCR), title 22, division 4.5, chapter 29. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: March 8, 2006.

[3] CCR, title 14, division 7, chapter 8. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006.

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[15] CHSC, division 20, chapter 6.5, article 13, section 25250.1.

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[17] CHSC, division 20, chapter 6.5, article 13, section 25250.19.

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[20] Gallagher interview.

[21] CIWMB, *Used Oil Recycling Program.* Online. Available: http://www.ciwmb.ca.gov/UsedOil/. Accessed: January 23, 2006.

[22] CHSC, division 20, chapter 6.5, article 4, section 25143.2. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc. Accessed: March 27, 2006.

[23] CCR, title 14, division 7, chapter 8, article 7, section 18655.1. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006.

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[34] CCR, title 14, division 7, chapter 8, article 6.1, section 18653.1. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006.

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[39] CCR, title 14, division 7, chapter 8, article 8, section 18658.1. Online. Available: http://government.westlaw.com/linkedslice/default.asp?SP=CCR-1000. Accessed: February 20, 2006.

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[47] Gallagher email.

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[50] Email from Sue Tracy, DTSC, "Re: Used Oil in Texas," to Amanda Van Epps, July 17, 2006.

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[53] Tracy email, July 17, 2006.

[54] Ibid.

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[56] Tracy email, March 27, 2006.

[57] Gallagher interview.

[58] CIWMB, *Used Oil Recycling Rate Annual Report: 2004.* Online. Available: http://www.ciwmb.ca.gov/UsedOil/RateInfo/default.htm. Accessed: April 17, 2006.

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[60] Ibid.

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[63] Ibid.

Chapter 6. Survey of State Used Oil Programs

In 1996 the American Petroleum Institute (API) published an analysis of used oil collection and recycling in the United States.[1] This chapter revises and expands some of the data found in the API sections on individual state programs to provide greater perspective to the used oil management system that currently exists in Texas. An online survey was distributed to waste management, recycling, and used oil contacts within state environmental agencies in December 2006 to collect current used oil program information. The survey contained questions regarding the existence and the development of used oil collection, monitoring, recycling and re-refining. Appendix A is a list of the state contacts who received the questionnaire. The data presented in this chapter come from the information provided by the 15 states that completed portions of the survey. Appendix B provides a state-by-state overview of the information provided by staff members in the responding states.

Survey Methodology

A questionnaire developed on the website Surveymonkey.com was sent to used oil contacts in the 50 states by email.[2] A copy of the questionnaire is included as Appendix C; it appears differently in electronic form versus print form. Emailing a web-based survey was selected in order to reduce the time that a participant would require to complete it, as the order of questions varied based upon the real-time responses provided by state staff members who completed the survey. For example, if a state replied that no used oil program exists, state staff were not asked questions about program specifics. This method of survey construction tailored the questionnaire to each state in order to improve clarity, reduce response time, and encourage a high response rate. The list of survey recipients was developed by revising contact information provided in the 1996 API report, through internet research, and by referral within state agencies. The survey was distributed by email on November 29, 2006, and staff members were asked to respond by December 15, 2006. Fifteen states responded to the survey and no states provided additional information. The data were compiled and analyzed using spreadsheet and statistical software.

Findings

Of the 15 states that replied, 11 reported used oil management programs and four did not. California, Illinois, Pennsylvania, Washington, Oregon, Utah, New Jersey, South Dakota, New Mexico, Wisconsin, and Arkansas all responded that they operated state used oil programs. Due to the differences in geography, demographics, economics, and regulations these programs take a wide variety of forms. Idaho, Virginia, Texas, and Nebraska responded that they did not operate state used oil management programs. Since the Texas and California programs are discussed in other chapters, neither of these states are discussed below.

States without Programs

Four states responded that they did not have used oil management programs: Idaho, Virginia, Texas, and Nebraska. The following section outlines the reasons each states does not currently have a program, the used oil collection available within the state, registration and reporting requirements, and staff reports on any state preferences to initiate a program. Texas requirements are described in Chapter 3.

Idaho indicated that the barriers to establishing a used oil management program in their state are a lack of public education, lack of convenience, liability concerns, and lack of available funding. While the government offers no collection options to individuals or industries, private collection exists through retailers and service outlets. Idaho requires the registration of transporters, collection centers, processors and re-refiners, but only requires that processors and re-refiners report the volume of used oil they handle on an annual basis. Idaho regulates used oil filters and has programs that encourage used oil recycling. Idaho's cites scattered population distribution and geography make it difficult for private companies to make money through collection alone:

> …it is not worth [it economically for] many private companies to conduct 'milk-runs' over large areas for small quantities of used oil. The main problem would be to develop some means of small communities to manage or use their used oil at their locations (i.e., burning for energy recovery) without transporting the used oil hundreds of miles.[3]

The State of Virginia reported an interest in developing a used oil management program but cited a lack of available funding as a barrier. Currently Virginia offers private collection options to residents but would like to develop a network of publicly administered collection sites for do-it-yourselfers. Some municipalities participate in a volunteer recycling program. The Virginia Department of Environmental Quality (DEQ) requires the registration of used oil transporters, processors and re-refiners, but does not require handlers to report volume data. The volume of used oil recycled is reported to the state by municipalities that participate in a voluntary used oil recycling program. The DEQ regulates disposal of used oil filters and they may not be thrown into landfills.[4]

The State of Nebraska indicated that there were no specific barriers to creating a used oil management program but that they did not think that a formal program would be a beneficial use of state resources. There are private methods of disposal available but none are administered by the state. Nebraska staff indicated on the survey that used oil handlers are not required to register or report volume data and there are no programs encouraging the recycling of used oil. Nebraska does ban the disposal of used oil filters in landfills. Although the Nebraska staffers do not believe a state run used oil management program is needed, they support the Keep Nebraska Beautiful program's efforts to develop a network of collection sites to keep used oil out of the environment.[5]

These four states represent a spectrum of alternatives to formal state administered used oil management models. Idaho faces a number of barriers to establishing a state administered program; for the same reasons it may be too costly for private businesses to

develop collection networks, it may be too costly for the state. Virginia has a solid foundation for the construction of a state-run program but lacks funding to upgrade their efforts. The information provided by Texas in the questionnaire was incomplete and therefore makes it difficult to draw conclusions based on the responses as to the interest in developing collection and recycling efforts. In the open-ended response portion of the questionnaire Nebraska staff, "advise[ed] that our limited resources be used where there are real problems."[6] As a network of collection sites administered by the Keep Nebraska Beautiful program already exists, they see no need to develop a state program.

States with Programs

The following sections describe used oil management activities in states indicating that they have operational used oil programs. Significant state-to-state differences exist in program budgets, sources of funding, program structure and organization. States also differ in the requirements for used oil handler registration and data reporting. are compared. One of the sections below details the goals of each state as described in response to an open-ended question.

Budgets, Funding, and Program Structure

The survey confirmed that the State of California has the most comprehensive used oil management program in the United States. The program, which has been in operation for 16 years, has a current annual budget of $20,000,000. Their budget is funded by a $0.04 per quart non-refundable fee on oil purchased in the state. Utah reported the second largest budget of $600,000, and it is the only other responding state to implement a $0.04 per quart non-refundable fee. Arkansas was the only responding state to rely upon refundable deposits to cover administrative costs, operational program costs. and public education programs.

The majority of state programs that responded received money through general funds allocated by their state legislature to their waste management or environmental agency. State respondents indicated that they were not able to specify the amount of funds used yearly by the program due to the integration of used oil program funds into the division-wide budget. There was a similar dearth of reporting on the number of full-time employees that work within a used oil program. Since responsibility for used oil is often spread among multiple divisions in an agency, few states could cite specifically the number of full-time employees working on used oil programs. California employs 23 workers in their used oil program. Utah employs five and South Dakota has eight full-time equivalents (FTEs) working on used oil issues. Other states (Illinois, Washington, Pennsylvania, New Jersey and New Mexico) reported "minimal" or less than one FTE working specifically or solely on used oil. Based on responses to the questionnaire, it appears that only Utah and California have employees dedicated solely to a used oil program.

Registration and Reporting

Registration of used oil handlers and the reporting of data are vital to understanding the generation, movement, and disposal of used oil. Table 6.1 lists the registration and reporting requirements for responding states.

Table 6.1
Registration and Reporting Requirements by State

	Entities Registering					Entities Registering				
State	G	CC	TR	P	RR	G	CC	TR	P	RR
California		X	X		X	NR	NR	NR	NR	NR
Illinois		X					A		A	A
Pennsylvania		X	X		X	A*				
Washington		X	X	X	X				A	A
Oregon	X	X	X	X	X		A	A	A	A
Utah		X	X	X	X		Q	A	A	A
New Jersey		X	X	X	X	A	A	A	A	
South Dakota			X	X	X				BE	BO
New Mexico		X	X	X	X				A	A
Wisconsin			X	X	X				B	B
Arkansas	X	X	X	X	X				A	A
Idaho		X	X	X	X				A	A
Virginia			X	X	X					
Texas		X	X	X	X					
Nebraska										

Source: Data collected by Leigh Otey.

Note: Blanks indicate registration or reporting not required, TR = Transporter, CC = Collection Center, P = Processor, RR = Re-refiners, A = Annual, BO = Biennial, odd years, BE = Biennial, even years, B = Biennial, no year specified, Q = Quarter, NR = No Response Provided.

* Motor oil excepted.

Filters and Disposal

Used oil filters represent a risk to environmental and human health when they are disposed of improperly. Although some states with used oil management programs do not regulate the disposal of used oil filters, all recognize it as an area of immediate concern and a way to improve their used oil programs. California, Illinois, Washington, South Dakota, Wisconsin, New Mexico, Idaho, Virginia, Texas and Nebraska staff indicated that their states prohibit the disposal of used oil filters in landfills.

Pennsylvania indicated that while it regulates disposal of used oil filters, filters can be thrown into landfills. New Jersey and Utah do not regulate the disposal of used oil filters at all and they also allow used oil filters to be thrown away in landfills. In response to the open-ended question that asked states to identify the ways in which their respective used oil programs could be improved, both states indicated that they would like for their programs to begin regulating used oil filters. Pennsylvania also responded in the survey that they would like to improve their program by banning the disposal of used oil filters in landfills.

Suggestions for Program Improvement

At the conclusion of the survey, states were asked how they would respond if their governor inquired as to how the used oil management program could be improved. The answers to this question varied widely and reflected the different foci and characteristics of each state program. Responses addressed the following needs: regulation of filter disposal, establishing or improving the fee collection method, or establishing practices and regulations encouraging reuse and recycling. The California non-refundable fee program is well established but they expressed a desire to improve their fee system by increasing the non-refundable fee from $0.04 per quart "…to a higher fee that will more effectively pay for an actual cost of collecting the used oil from DIYers (for example, $0.04 per quart)."[7]

California staff also indicated that they would like to administer a similar non-refundable fee program for used oil filters. Wisconsin staff stated that their program could be improved by creating a non-refundable fee like the one utilized by California and Utah.

Many states expressed a preference to identify means to encourage the reuse and recycling of used oil. Oregon contracts out local government and recycling curbside services but says few residents realize that curbside used oil collection is a service offered statewide. They would like to publicize options better but the service is contracted out, and the money and responsibility for disseminating service information is included in the private service contract.

In addition to seeking regulation of used oil filters, Utah would like to encourage the markets for re-refined motor oil by requiring state agencies to purchase it for use in all state-owned vehicles. While this may encourage market growth in the long term, it could put pressure on agency budgets in the short run. Currently only a few companies in the U.S. re-refine used oil, so it is not know how easy it will be for Utah agencies to gain access to re-refined oil.[8]

Wisconsin staff expressed an intent to require the recycling of all used oil absorbents and used oil filters. Due to the fact that only transporters, processors, and re-refiners are required to register and only processors and re-refiners are required to report the volume of used oil they handle every two years, it may be difficult to enforce these types of measures. Wisconsin staff also indicated that they estimate the number of employees devoted to used oil at less than or equal to one. If they were to require recycling of used

oil absorbents and filters, they would probably have to increase staffing to ensure compliance.[9]

Washington staff noted that they would like to increase testing used oil generation sites. The used oil program in Washington operates out of their hazardous waste program. In addition to service outlets and retailers, Washington offers used oil collection at moderate risk waste facilities.[10]

Conclusions

Due to the diverse natures of these used oil programs and the variety of statutory regulations that govern used oil management, it is difficult to compare programs across states. The most important factors in the development of a state administered used oil program appear to be adequate funding and available staff. Since state environmental agencies are under budgetary pressure, funding becomes an important barrier to establishing independent used oil programs. Efforts to collect used oil appear to be increasing in scope only in the states with established sources of revenue.

There were signs of program development in some states when 2006 survey responses were compared to information provided in the 1996 API report. For example, Arkansas indicated that they now operated a used oil program which began after the API report's 1996 publication. Since the 1996 API report New Mexico and Illinois staffers indicate that they have established state sponsored used oil programs.[11]

In many states, staff responses indicated that little had changed in state used oil management programs since the 1996 API report was published. In the API report, Idaho indicated that they were considering a used oil collection program, and Idaho staffers indicated that they are still considering the implementation of a state administered used oil collection program.[12] Nebraska, New Jersey, Utah, Oregon, South Dakota, Virginia and Washington indicated that little has changed in their states since 1996.[13] Since 1996 Oregon has recognized problems with their curbside collection program's educational component and indicate that they are addressing these problems.[14]

In some states it appears that efforts to manage used oil are either decreasing or program changes have made their administration more efficient. Pennsylvania staffers also reported a reduction in their used oil program through a decrease from one staff member to no staff members dedicated solely to used oil.[15] It cannot be determined whether the removal of a used oil specific staff member was due to a reduction in Pennsylvania's effort to collect and recycle used oil or a reorganization of responsibilities within the Pennsylvania Department of Environmental Protection. While responses indicate that some programs are growing, many appear to be maintaining similar operations or are actually decreasing in scope. While the responses gathered do not indicate why a program would shrink, it shows that used oil management does not register as a priority within some states.

Notes

[1] American Petroleum Institute*, Used Motor Oil Collection and Recycling* (Washington, D.C.: API Publishing Services, 1996), p. ix.

[2] SurveyMonkey, *Window on SurveyMonkey Home*. Online. Available: http://www.surveymonkey.com/. Accessed: October 20, 2006.

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[4] Virginia survey responses; Virginia Department of Environmental Quality. Online. Available: http://www.deq.virginia.gov. Accessed: June 18, 2007.

[5] Nebraska survey responses; Keep Nebraska Beautiful. Online. Available: http://www.knb.org. Accessed: June 18, 2007.

[6] Ibid.

[7] Ibid.

[8] United States Department of Energy (DOE), Office of Fossil Energy, *Used Oil Study and Recommendations to Address Energy Policy Act of 2005 Section 1838* (Washington, D.C., July 2006), p. 9-7.

[9] Wisconsin survey responses.

[10] Washington survey responses.

[11] API, *Used Motor Oil Collection and Recycling Report*, p. 69.

[12] Ibid.

[13] Ibid., pp. 78-91.

[14] Ibid., p. 84.

[15] Ibid., p.85.

Chapter 7. Technical Aspects of Used Oil Processing and Re-Refining

Used oil originates from all manner of lubricants, a category of oil covering a broad range of finished petroleum products, including motor oils, transmission fluids, other automotive oils, as well as hydraulic oils, gear oils, and metal working fluids and other industrial use oils.[1,2] These lubricants are produced by blending various base oils, produced either from refining of crude oil or from re-refining of used oil, with each other and with additives. Furthermore, lubricating oils by nature are intended to have other items, such as engine or machine parts, in them during use, leading to a change in their quality and purity over time.

These oils are, by nature, a mixture of a number of different chemical constituents, among them base oils, additives, and impurities. Used oil processing and re-refining have been designed to separate out the desirable components of used oil from the undesirable components. However, the intended product of each of these treatment processes is very different. Used oil processing varies in severity but generally produces fuel oil that can be used in a number of ways, typically either as fuel in industrial furnaces or in marine diesel engines.[3] Re-refining on the other hand generates base oils that are comparable to those that are produced by refining of crude oil, that can be blended with one another and with additives to produce lubricating oil.[4,5]

This chapter discusses the factors that affect what used oil processing and re-refining must accomplish. These specifications include: the required performance characteristics of the recycled product (either fuel oil or lubricating oil); the components of the virgin lubricating oil before use and the refining process used to produce the virgin lubricating oil from crude oil; the changes in the oil during its use as lubricant; and the processes used to treat them after use.

Performance Measures for Products of Recycling Processes

The objective of these processes requires an understanding of the varied performance characteristics required for the respective products used oil processing and re-refining.

Used Oil Processing to Produce Fuel Oil

Although many important characteristics of industrial fuel oil and marine diesel are similar, they are produced and used differently (see Table 7.1).

Table 7.1
Performance Characteristics of Fuels Produced by Used Oil Processing

Constraint	Required Oil Properties
Burner or engine performance	• Viscosity in design range • Low asphaltene content
Maximal energy recovery	• High heating value • Low sulfur content • Low water content • Low sediment content
Control of emissions	• Low sulfur content • Low nitrogen content • Low asphaltene content
Corrosion prevention	Low metals contamination

Source: Jean-Pierre Wauquier, ed., "Crude Oil, Petroleum Products, Process Flowsheets," *Petroleum Refining*, vol. 1 (Paris: Éditions Technip, 1995), p. 236.

The most important characteristics for used oil used as fuel (either in an industrial burner or in a marine diesel engine) are the viscosity of the oil, the sulfur content, and the content of asphaltenes in the oil.[6] Burners and engines are designed for operation using a fuel with a viscosity within a certain range; therefore, one goal of processing used oil is a product within the ideal range.[7]

The ability of the process to recover the energy of the fuel oil used depends on the heating value of the fuel, or the amount of energy that is released by the combustion of one unit of fuel.[8] The presence of contaminants, including sulfur, water, and sediment can lower the heating value of a fuel oil. Fuel oils with lower heating values are generally less desirable because they command lower prices on the market.[9]

Sulfur content is also important because combustion of fuel oil containing sulfur produces sulfur dioxide, the emission of which is often regulated for industrial emitters.[10,11] It is desirable to reduce emission of nitrous oxides, which originate both from the nitrogen content of the fuel as well as the nitrogen content of the air consumed in combustion.[12] Other considerations include the presence of metal contaminants, including vanadium, nickel, sodium, or aluminum, which can cause corrosion of the engine or burner.[13]

Maintaining low concentrations of asphaltenes in fuel oils is advantageous for two reasons. High concentrations of asphaltenes generally interfere with complete combustion unless changes in operating conditions are made to compensate for their presence.[14] The presence of asphaltenes in industrial burners can result in solid residues that do not combust.[15] Combustion of asphaltenes also can result in particulate emissions that may also be regulated.[16]

Used Oil Re-refining to Produce Lubricating Oil

Each type of oil product has a variety of ideal performance characteristics that depend on the intended use.[17] Automotive oils accounts for approximately 60 percent of demand for lubricating oils in the U.S. Industrial oils account for 20 percent of U.S. demand, and the remainder includes process oils, grease, and other lubricants.[18] For example, motor oil lubricates moving parts under high heat and pressure; therefore, a finished motor oil product must balance a number of desirable characteristics, such as ability to operate across a broad range of temperatures, protection against degradation of the motor parts by corrosion or wear, and a useful life of at least 3,000 miles of driving.[19] Industrial oils, on the other hand, are intended to lubricate moving metal parts under a range of temperatures and working environments that are not typically as extreme as those in an automobile engine. An industrial oil might also be expected to lubricate across a range of temperatures and protect against wear of the machinery in which it is used, but more emphasis might be placed on extending its useful life and minimizing oil degradation throughout use.[20]

Tables 7.2 and 7.3 list the key performance characteristics of motor oils and industrial oils, the two dominant categories among lubricating oils.

Table 7.2
Performance Characteristics of Motor Oils

Constraint	Required Oil Properties
Motor performance	• Lubrication properties • Constant viscosity (viscosity index) • Fluidity at low temperatures • Proper viscosity at high temperature
Maintaining motor cleanliness	Detergent and dispersant power
Corrosion and anti-wear protection	• Anti-corrosion and anti-wear power • High viscosity at high shear rates
High temperature operation	Thermal stability
Oil change interval	Oxidation stability
Low consumption	High viscosity, low volatility
Gasket compatibility	• Adapted composition • Low aggressivity
Energy economy	• Low viscosity • Reduced friction
Control of emissions	• Low consumption • Low volatility • Constant viscosity
Environment	Absence of toxic compounds such as polychlorinated biphenyls (PCBs)

Source: Jean-Pierre Wauquier, ed., "Crude Oil, Petroleum Products, Process Flowsheets," *Petroleum Refining*, vol. 1 (Paris: Éditions Technip, 1995), p. 282.

Table 7.3
Characteristics of Industrial Oils

Constraint	Required Oil Properties
Large range of service temperatures	• Constant viscosity (viscosity index) • Pour point • Thermal stability
Protection of lubricated members	• Viscosity selection • Anti-wear power • Anti-corrosion power
Maintaining cleanliness	• Detergent and dispersive powers • Filterability
Life span	Resistance to oxidation
Volume reduction in service	• Thermal stability • Resistance to oxidation, deaeration
Controlling emissions of gas and fog	Low volatility
Shop environment	Odor
Skin toxicity	Low polynuclear aromatic (PNA) content
Gasket compatibility	• Adapted composition • Low aggressivity
Environment	Absence of toxic compounds such as polychlorinated biphenyls (PCBs)

Source: Jean-Pierre Wauquier, ed., "Crude Oil, Petroleum Products, Process Flowsheets," *Petroleum Refining*, vol. 1 (Paris: Éditions Technip, 1995), p. 283.

Viscosity, pour point, and chemical stability are the most important characteristics for both motor oil and industrial lubricants. Oils that lubricate machinery are used across a variety of temperatures and environmental conditions. Viscosity, or the "measure of internal resistance [of a liquid] to flow,"[21] is an important characteristic of lubricating oils because the ability of the oil to flow is essential to the ability to cover and lubricate all moving parts.[22] The viscosity must be high enough to coat and protect the moving parts and reduce friction between parts even at high operating temperatures. However, the viscosity cannot be so high such that it prevents the start up of the engine and the movement of the parts at low temperature.[23] One common indicator of viscosity, the viscosity index (VI), also offers a measure of the stability of the oil. The VI indicates the ability of the oil to maintain constant viscosity across the broad range of temperatures at which it might be expected to operate.[24] The VI is calculated based on the viscosity of the oil at both 40°C and 100°C,[25] as shown in the following equation.[26]

$$VI = 100\frac{\nu_{ref,0} - \nu_{40°C}}{\nu_{ref,0} - \nu_{ref,100}}$$

where VI = viscosity index,

$\nu_{40°C}$ = kinematic viscosity at 40°C of the oil for which the VI is being calculated;

$\nu_{ref,0}$ = kinematic viscosity at 40°C of a reference oil with VI of 0; and

$\nu_{ref,100}$ = kinematic viscosity at 40°C of a reference oil with VI of 100.

Kinematic viscosity is defined as the ratio of the absolute viscosity of a liquid to its density.[27] The two reference oils used in the calculation should have the same kinematic viscosity at 100°C as the oil for which the VI is being calculated.[28]

Liquid viscosity generally declines with increased temperature.[29] A higher VI, indicating a more constant viscosity as temperature changes, is desirable, as the decline in viscosity at high temperatures still results in adequate viscosity and protection of parts.[30] Typical base oils have a VI of approximately 100, but the VI of a lubricating oil might reach 150 or higher with treatment.[31] More viscous lubricating oil generally also means that less lubricant is required. However, any preference to use less lubricant must be balanced by the energy requirements, as more viscous lubricants cause more resistance to moving parts.[32] In addition to maintaining fairly constant viscosity even at high temperatures, it is also important that the oils are not very volatile; otherwise, too large of a volume of oil would evaporate or otherwise be consumed in use and not be available for lubrication. Volatility of lubricating oils would also result in greater emissions of lubricating oils.[33]

Motor oils, in particular, must also operate even at initial engine start up when the engine is cold. Thus, the lowest possible "pour point," the lowest temperature at which the oil can still be poured, is desirable.[34,35,36]

Chemical stability is important to limit oxidation of the oil that might occur given the temperature, available oxygen, and metal catalysts that are present in the operating environment for a motor oil.[37] Oxidation not only degrades the oil, but compounds that are formed can leave deposits on the inside of the motor and can even cause corrosion.[38] Resistance to oxidation allows oil to maintain its lubricating abilities between oil changes.[39] Since oil change intervals are increasing and some oil oxidation and breakdown will occur, some uses still require the use of detergent or dispersant additives to minimize the deposition of any of the degradation compounds on the walls of the chambers.[40]

Refining of Lubricating Oils from Crude Oil

Almost 40 percent of motor oil is lost during use.[41] Of the 60 percent remaining after use, only 12 percent is re-refined nationally.[42] Therefore, the majority of the lubricating oils that are manufactured and sold must originate from virgin base oils derived from crude oil. There are two primary steps in the manufacture of lubricating oils from crude oil: refining of crude oil to produce base oils and blending of different base oils with each other and with additives.[43]

Refining of Crude Oil to Produce Base Oils

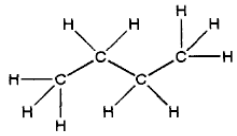
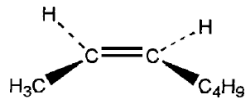
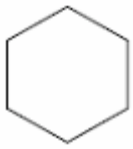
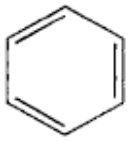
Crude oil is composed of a broad range of hydrocarbon compounds and impurities.[44,45] Molecular weights vary greatly among the hydrocarbons themselves; increased molecular weight components generally have higher boiling points.[46] Structurally, there are three categories of hydrocarbons in crude oil: alkanes, cycloalkanes, and aromatics.[47]

Table 7.4 summarizes these hydrocarbon categories and shows an example of each. Alkanes (also called paraffins) are saturated hydrocarbons, in which all bonds between carbon atoms are single bonds, and all carbons atoms are saturated with hydrogen molecules.[48] Cycloalkanes (also called cycloparaffins or naphthenes) are also saturated hydrocarbons, but the carbon backbone has formed a cyclic structure. Aromatics contain a benzene ring with alternating double and single bonds between carbon atoms in the ring and exhibit a high level of stability.[49] A fourth structural category, alkenes (or olefins) are not found in crude oil but can be produced in the refining process. They contain at least one double bond between carbon atoms, which makes them more reactive and susceptible to degradation processes such as oxidation and therefore not desired in a finished petroleum product.[50]

The hydrocarbons that comprise the base stocks of lubricating oils generally contain chains of 18 to 34 carbon atoms and have boiling points between 325 and 600°C.[51,52] The refining process allows the separation of this particular subset of hydrocarbons from the rest of the crude oil fractions. The typical overall process for production of lubricating oil from crude oil includes atmospheric distillation, vacuum distillation, deasphalting, solvent refining, solvent dewaxing, and hydrogen refinishing. The typical process for manufacturing a paraffinic lubricating oil is shown in Figure 7.1 and the comparable process for manufacturing a naphthenic lubricating oil is shown in Figure 7.2.

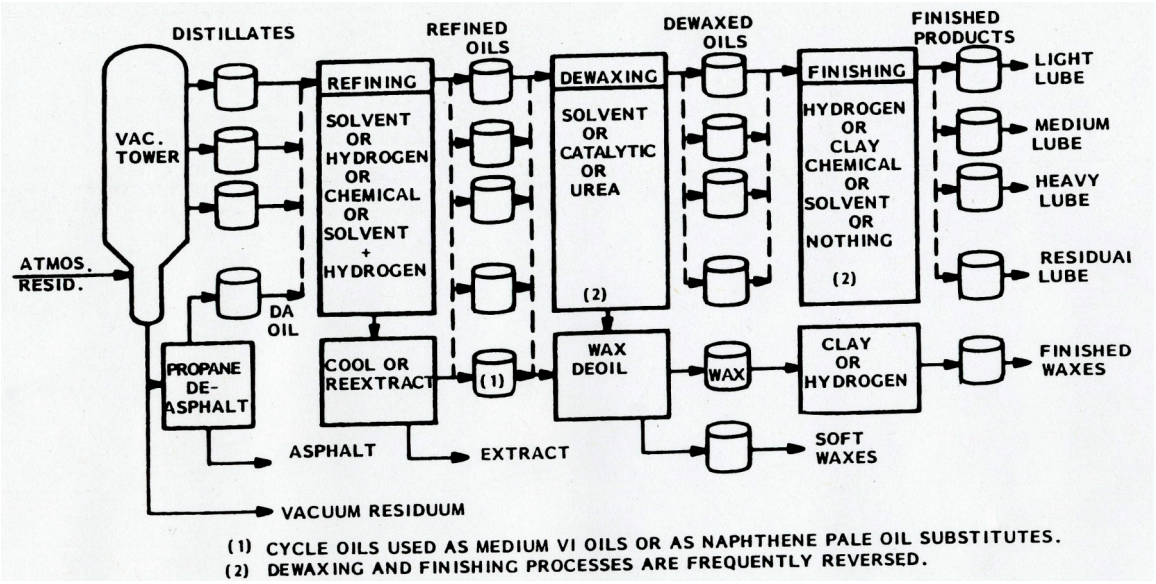
Although the downstream processes can vary widely, the first step in that processing is generally the distillation of the crude oil into various hydrocarbon fractions based on their boiling points.[53] Sediment, salt, and some of the impurities may be removed from the crude oil in a preparatory step by desalting.[54] Desalting can be accomplished by washing the crude oil with water at a temperature of 90 to 150°C. If the water is then separated from the oil phase, salts and other contaminants will largely be removed with the water.[55] Removal of these impurities helps reduce the amount of corrosion and fouling that may occur in the refining process. Some metals, if not removed in this desalting step, also have the ability to deactivate the catalyst used in later processing steps.[56] After desalting, the crude oil is sent to a distillation unit. A typical process flow diagram for distillation of crude oil is shown in Figure 7.3. The liquid is heated, and the hydrocarbon fractions are separated based on boiling point with the lowest boiling point compounds evaporating first. The vapor is collected and cooled causing it to condense.

Table 7.4
Classes of Hydrocarbons Typically Present in Crude Oil

Category	Description	Example Chemical Structure	Note
Alkanes	Carbon chain with single bonds between them	n-Butane: 	Also called paraffins
Alkenes	Carbon chains with at least one carbon-carbon double bond	cis-2-Heptene: 	Not typically found in crude oil
Cycloalkanes	Single bonded carbon ring structure	Cyclohexane: 	Also called cycloparaffins or naphthenes
Aromatics	Primary structure is the benzene ring made up of six carbon atoms with alternating single and double bonds	Benzene: 	Also called olefins

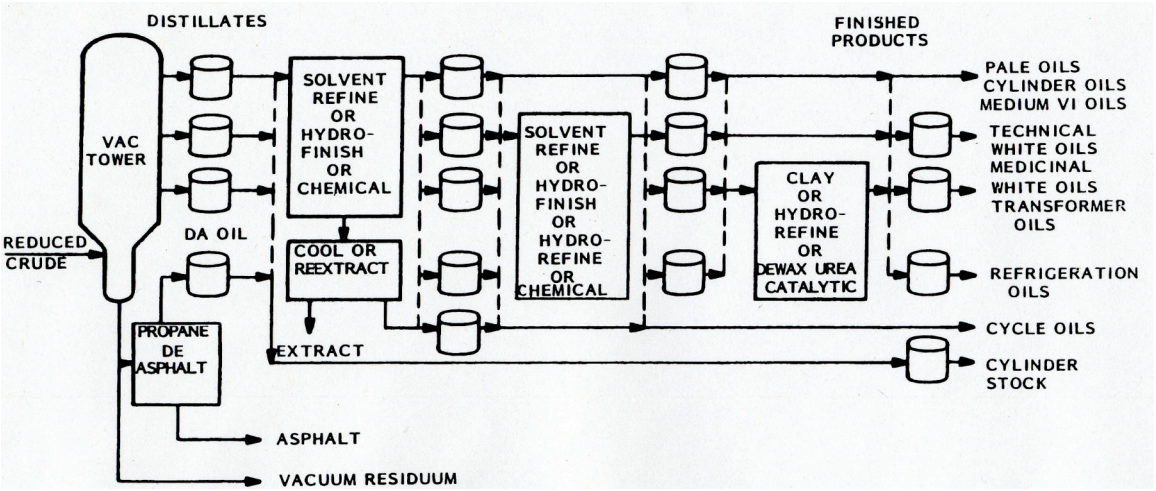
Sources: Wade Weisman, ed., *Analysis of Petroleum Hydrocarbons in Environmental Media*, TPH Criteria Working Group Series, vol. 1 (Amherst, Mass.: Amherst Scientific Publishers, 1998), pp. 53-57. Online. Available: http://www.aehs.com/publications/catalog/contents/Volume1.pdf. Accessed: August 5, 2006; and Thomas L. Potter and Kathleen E. Simmons, *Composition of Petroleum Mixtures*, TPH Criteria Working Group Series, vol. 2 (Amherst, Mass.: Amherst Scientific Publishers, 1998), p. 2-8. Online. Available: http://www.aehs.com/publications/catalog/contents/Volume2.pdf. Accessed: August 5, 2006.

Figure 7.1
Process Flow Diagram for Manufacture of Paraffinic Lubricating Oil



Source: John J. McKetta, ed., *Petroleum Processing Handbook* (New York: Marcel Dekker, Inc., 1992), p. 635.

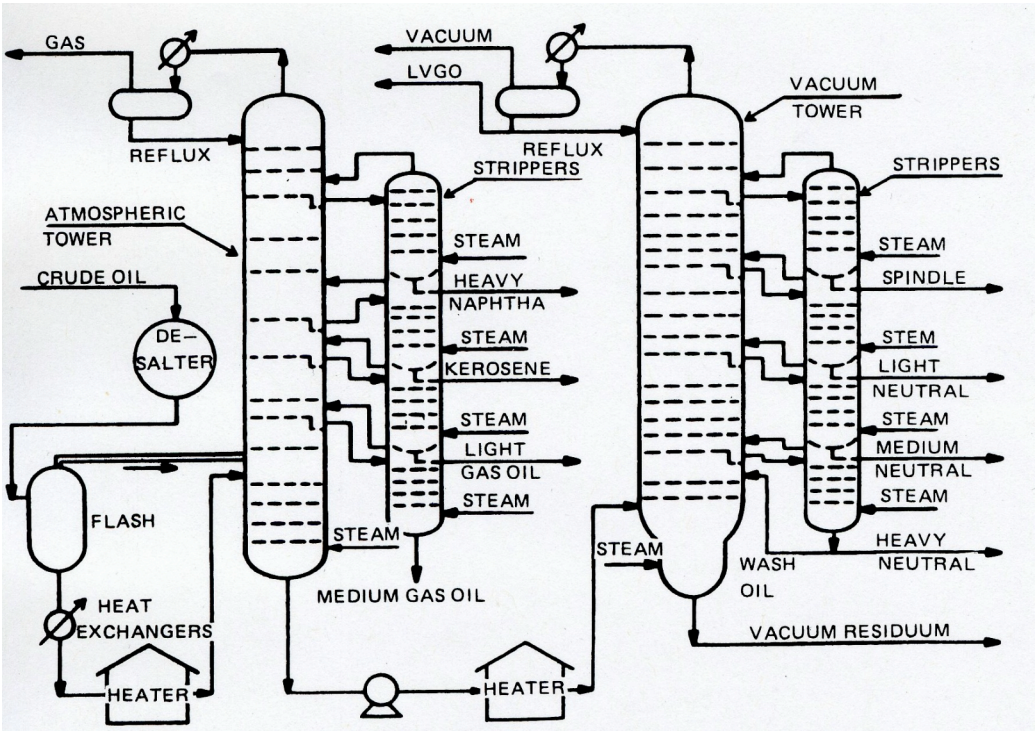
Figure 7.2
Process Flow Diagram for Manufacture of Naphthenic Lubricating Oil



Source: John J. McKetta, ed., *Petroleum Processing Handbook* (New York: Marcel Dekker, Inc., 1992), p. 636.

When this evaporation and condensation are performed in a controlled manner within a distillation unit, different distillates within a certain boiling range can be separated and collected.[57] Generally, crude oil will be fed first to an atmospheric distillation unit (ADU) where distillation occurs at atmospheric pressure up to an upper temperature limit ranging between 260 and 400°C.[58] Heating to temperatures beyond this upper limit might break the hydrocarbon molecule into smaller molecules (in a process known as "cracking") instead of simply causing the larger molecules to vaporize.[59,60] Since there are hydrocarbon fractions that boil beyond this upper limit, including some that are used in lubricating base oils, the residual from the ADU is usually sent to a vacuum distillation unit (VDU).[61] In the VDU, the pressure might be 4.5 to 5.5 pounds per square inch (psi) as compared to the 14.7 psi exerted by the atmosphere. Boiling of the heavier fractions is induced at lower temperatures at a reduced pressure.[62] Lubricating oils tend to include heavy end distillates; therefore, the ability of the VDU to produce well-separated and pure crude oil fractions is essential to the production of lubricating oils.[63] Lime or some other agent may be added to the distillation units in order to neutralize organic acids that may be present in distillates. Removal of these acids reduces corrosion in the refining processes and simplifies further refining. The removal leaves a more desirable color and a more stable distillate more amenable to further refining.[64,65]

Figure 7.3
Process Flow Diagram for Distillation of Crude Oil

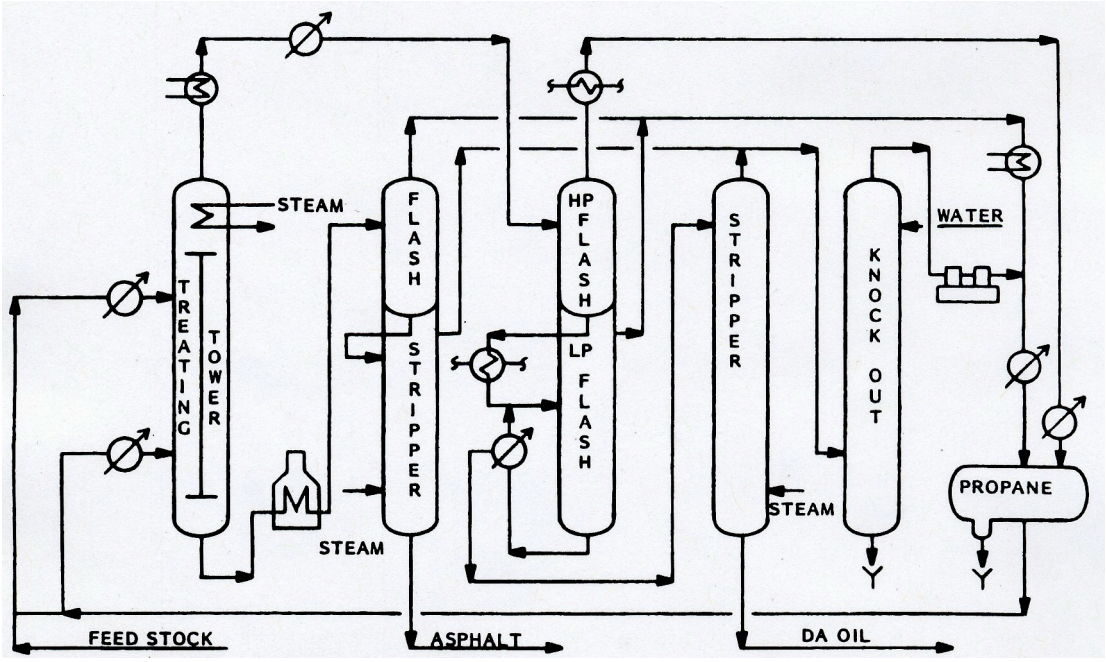


Source: John J. McKetta, ed., *Petroleum Processing Handbook* (New York: Marcel Dekker, Inc., 1992), p. 639.

Further processing generally is carried out to improve the stability, viscosity and VI, color, and other characteristics of the base oils.[66,67] A number of possible refining processes may be employed, but the general processing scheme involves four further steps: solvent deasphalting, solvent refining, solvent dewaxing, and hydrogen finishing.[68,69]

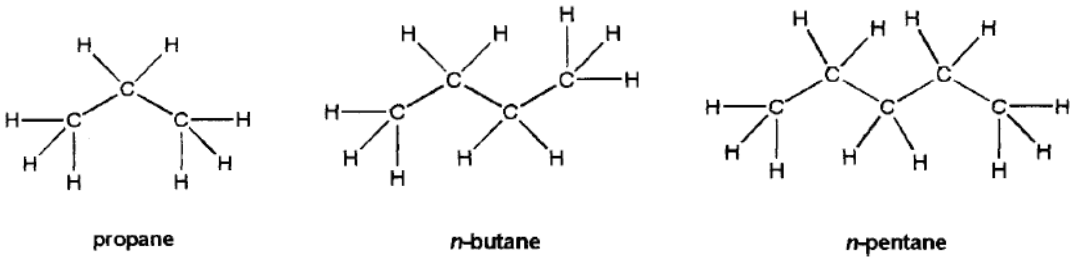
Solvent deasphalting is a liquid-liquid extraction process[70] in which the compounds that dissolve in the chosen solvent will be separated from the compounds that do not.[71] A typical process flow diagram for solvent deasphalting is shown in Figure 7.4. Typically, propane (shown in Figure 7.5) is the solvent employed,[72] but butane and pentane may also be used.[73] The objective of the extraction is to separate out the desirable hydrocarbon fractions from asphaltenes and other constituents of the vacuum distillates that have the potential to affect the color of the base oils adversely as well as leave carbonaceous residues when heated.[74] This extraction is possible because propane does not dissolve asphaltenes at temperatures between 38 and 97°C, but paraffins exhibit high solubilities in propane from 37 to 60°C and continue to be somewhat soluble up to 97°F.[75]

Figure 7.4
Process Diagram for Propane Deasphalting



Source: John J. McKetta, ed., *Petroleum Processing Handbook* (New York: Marcel Dekker, Inc., 1992), p. 641.

Figure 7.5
Typical Solvents for Used In Solvent Deasphalting

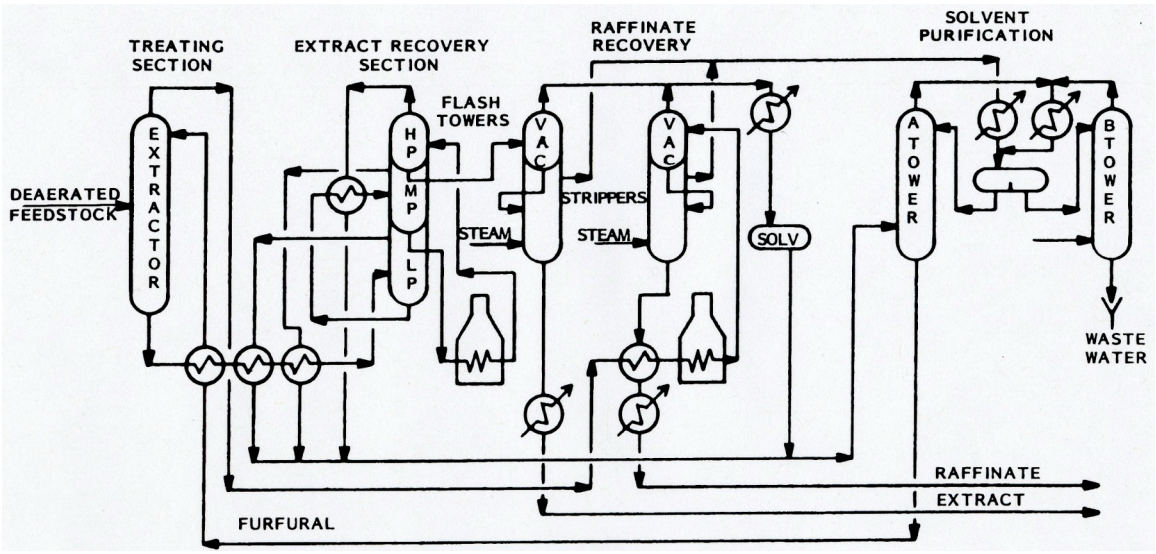


Source: Thomas L. Potter and Kathleen E. Simmons, *Composition of Petroleum Mixtures*, TPH Criteria Working Group Series, vol. 2 (Amherst, Mass.: Amherst Scientific Publishers, 1998), p. 2-4. Online. Available: http://www.aehs.com/publications/catalog/contents/Volume2.pdf. Accessed: August 5, 2006.

Solvent refining may be employed after deasphalting in order to remove aromatics and other constituents that may adversely affect the color or the viscosity.[76] Solvent refining is also a liquid-liquid extraction process like the deasphalting process.[77] One commonly employed process is the Edeleanu process, named after the engineer who developed it in 1907. In the Edeleanu process, the deasphalted oil would be introduced to the bottom of a column and the solvent introduced to the top. As the oil is forced toward the top and the solvent falls, the aromatics would be dissolved by the solvent and exit the column with it. The solvent would be separated from the aromatics by distillation and recycled to the head of the column.[78] A number of different solvents can be used in solvent refining, such as furfural, phenol, and N-Methyl-2-pyrrolidone.[79,80] A typical process flow diagram for furfural refining is presented in Figure 7.6. In all cases, the undesirable aromatics are soluble in the solvent employed while the parrafins and desirable hydrocarbons are less so.

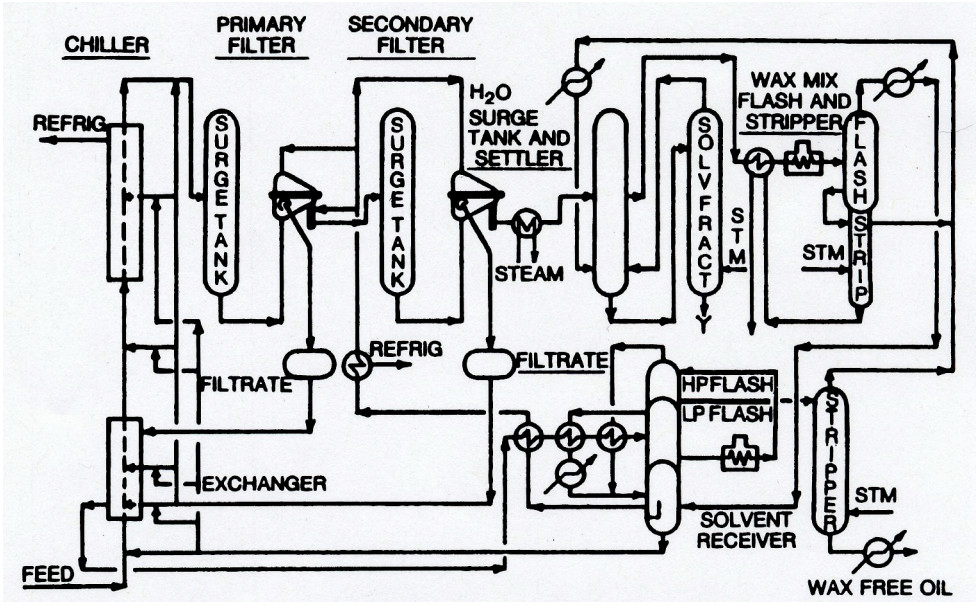
Dewaxing removes components with high freezing points that remain in the oils.[81] Constituents with high freezing points are more likely to be solid at typical temperatures, which would adversely affect the low temperature performance of lubricating oils and raise their pour point.[82,83] Solvent dewaxing with ketones is typical although catalytic dewaxing and urea dewaxing can be employed.[84,85,86] In solvent dewaxing, solvent is added to the hydrocarbon feed, and the resulting solution is cooled. The waxes will be solidified, and the solvent dilutes the oil sufficiently such that these waxes can be filtered from the solution.[87,88] The solvent can then be separated from the oil by distillation and recycled.[89] Ketones such as methyl ethyl ketone are typically used as the solvent in dewaxing, but propane may also be used.[90] A process flow diagram for the Texaco solvent dewaxing process, employing a mixture of methyl ethyl ketone and toluene, is shown in Figure 7.7.

Figure 7.6
Process Diagram for Furfural Refining



Source: John J. McKetta, ed., *Petroleum Processing Handbook* (New York: Marcel Dekker, Inc., 1992), p. 651.

Figure 7.7
Process Diagram for Solvent Dewaxing



Source: John J. McKetta, ed., *Petroleum Processing Handbook* (New York: Marcel Dekker, Inc., 1992), p. 657.

A final step in preparation of the base oil components is hydrogen finishing,[91] which can improve the color of the resulting base oils and make the oil more stable under conditions of thermal extremes and oxidation.[92] The oil is mixed with hydrogen and then passed through a fixed bed filled with catalyst.[93,94] Although hydrogen finishing is milder than hydrogen refining or hydrocracking processes,[95] the hydrogenation process does saturate some hydrocarbon compounds, neutralize some residual compounds in the oil, and remove both sulfur or nitrogen to form hydrogen sulfide and ammonia.[96,97] Acid finishing and clay finishing processes were also developed for purposes of finishing lubricating base oils, but hydrogen finishing predominates today.[98] The product of the hydrogen finishing process will be the lube oil base stock of a specific distillation fraction. The next stop is blending of one or more of these base stocks with additives to produce the finished lubricant with the preferred characteristics.[99]

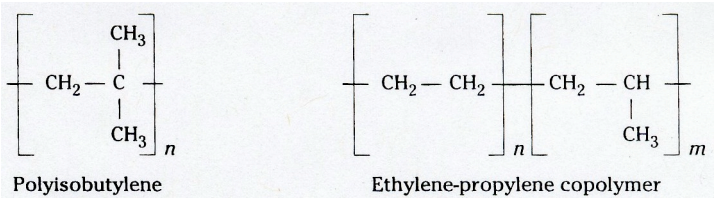
Blending of Base Oils and Additives

Eighty percent or more of lubricating oil is made up of base oils,[100,101] but, in many cases, the physical or chemical properties required for an end use (including viscosity or VI, pour point, chemical stability, and resistance to oxidation) can be achieved or improved through additives.[102] Industrial oils typically have fewer additives (5 percent or less) than motor oils because the environments in which industrial oils are used are not as extreme in temperature and other environmental conditions.[103]

Viscosity is one of the most important characteristics of lubricating oils, and viscosity additives may comprise five to ten weight percent of the finished lubricating oil.[104] The objective of these additives is to improve the viscosity index by increasing high temperature viscosity without having large increases in viscosity at low temperatures.[105] These additives are generally hydrocarbon polymers and may include an ester functional group such as polymethacrylates or polyacrylates, examples of which are shown in Figures 7.8 and 7.9.[106,107] The long hydrocarbon chains are tightly wound up at low temperatures to minimize interactions with the surrounding oil solvent. If the additive is taking up little volume in the solution, then the increase in viscosity at low temperatures will be minimal. As temperature increases, the hydrocarbon chains will unwind, take up more volume of the solution, and therefore make the solution more viscous at high temperatures than it would have been without the additive.[108]

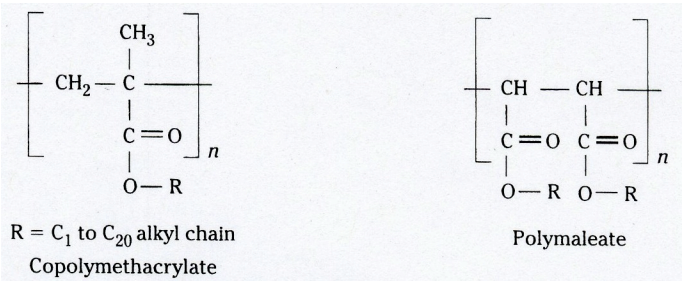
Another desirable characteristic of lubricants is a low pour point, and additives can lower the pour point of a lubricant up to 30°C.[109] Additives are needed to counteract the precipitation of paraffinic hydrocarbons in the oils.[110] Compounds such as polyalkylnaphthalenes or alkyl polymethylacrylates work by interfering with the crystalline structure of the paraffins and preventing these compounds from precipitating out of solution.[111] Examples of additives used for pour point depression are shown in Figure 7.10. Typically, additives to lower the pour point constitute less than 1 percent of the weight of the finished lubricant.[112]

Figure 7.8
Example Hydrocarbon Additives for Viscosity Improvement



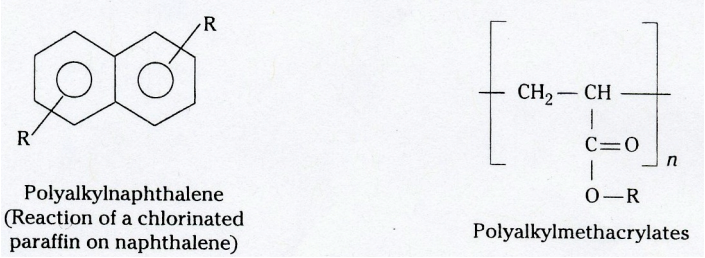
Source: Jean-Pierre Wauquier, ed., *Crude Oil, Petroleum Products, Process Flowsheets*, Petroleum Refining, vol. 1 (Paris: Éditions Technip, 1995), p. 356.

Figure 7.9
Ester Functional Group Additives for Viscosity Improvement



Source: Jean-Pierre Wauquier, ed., *Crude Oil, Petroleum Products, Process Flowsheets*, Petroleum Refining, vol. 1 (Paris: Éditions Technip, 1995), p. 357.

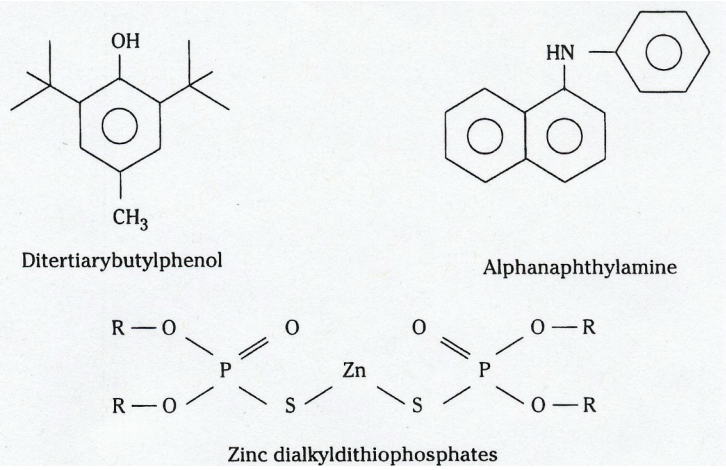
Figure 7.10
Example Additives for Pour Point Depression



Source: Jean-Pierre Wauquier, ed., *Crude Oil, Petroleum Products, Process Flowsheets*, Petroleum Refining, vol. 1 (Paris: Éditions Technip, 1995), p. 357.

A lubricant's chemical stability can also be improved by additives that enhance its antioxidant properties. These compounds work by either degrading peroxides that would initiate the oxidation process or by inactivating the metal catalyst.[113] One common antioxidant additive is zinc dialkyl-dithiophosphates,[114] but phenols, dithiophosphates, dithiocarbamates, and alkylated aromatic amines may also be used.[115] Examples of zinc dialkyl-dithiophosphates phenols, and aromatic amines used as antioxidant additives are shown in Figure 7.11. Antioxidant additives may comprise up to 10 percent of the finished lubricant.[116]

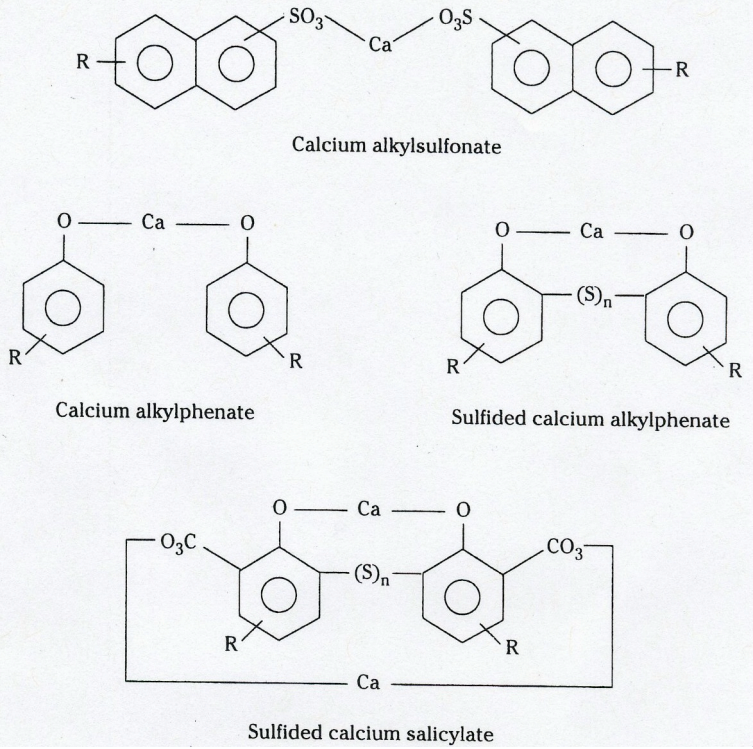
Figure 7.11
Example Antioxidant Additives



Source: Jean-Pierre Wauquier, ed., *Crude Oil, Petroleum Products, Process Flowsheets*, Petroleum Refining, vol. 1 (Paris: Éditions Technip, 1995), p. 359.

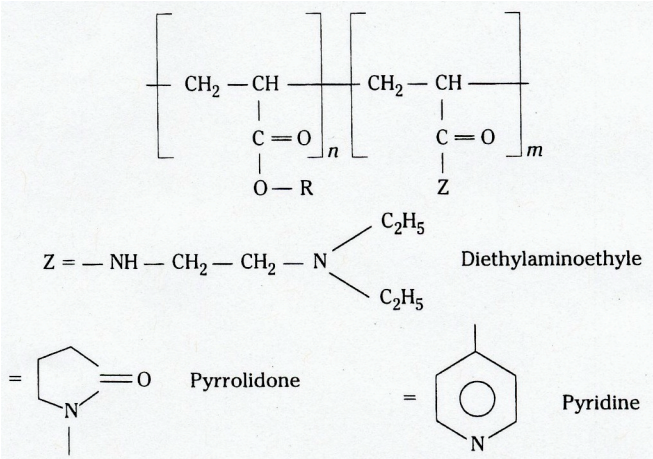
Some oxidation will occur in any lubricant, making detergent or dispersant additives useful.[117] Detergent additives also contain a metal base that will work to neutralize organic acids, and will also adsorb to metal surfaces thus limiting corrosion of these surfaces.[118] Dispersant additives cause the degraded oil products to remain suspended in the oil.[119] Typical additives are sulfonates, thiophosphonates, phenates, salicylates, and succinimides,[120] and they may comprise 5 to 15 percent of the finished lubricant.[121] These additives contain surfactants and are amphiphilic, having both hydrophilic and hydrophobic parts.[122] Example detergent and dispersant additives are shown in Figures 7.12 and 7.13, respectively. One of the prime differences between detergent and dispersant additives is the composition of the hydrophilic part of the compound: in a detergent it may be a metal such as calcium or magnesium while in a dispersant it may be an organic compound.[123] Other additives may also be used to inhibit corrosion, or to counteract foaming, or to otherwise enhance oil stability under extreme conditions.[124]

Figure 7.12
Example Detergent Additives



Source: Jean-Pierre Wauquier, ed., *Crude Oil, Petroleum Products, Process Flowsheets*, Petroleum Refining, vol. 1 (Paris: Éditions Technip, 1995), p. 361.

Figure 7.13
Example Dispersant Additives



Source: Jean-Pierre Wauquier, ed., *Crude Oil, Petroleum Products, Process Flowsheets*, Petroleum Refining, vol. 1 (Paris: Éditions Technip, 1995), p. 362.

Changes in Lubricating Oil During Use

One of the challenges facing all used oil handlers is that used oil can vary tremendously in composition. Some of this variety depends upon the initial composition of the oil manufactured and the quantity and variety of additives that were required for optimal first-time use, but oil does change in composition over the course of use.[125,126] The higher use of synthetic motor oil is also changing used oil.[127]

The composition of the hydrocarbons that comprise the use oil may shift as a result of product use. One example is that alkenes (hydrocarbons that contain at least one carbon-carbon double bond) are typically produced during motor oil use, so used oil will contain much greater quantities of alkenes than virgin motor oil.[128] In addition, used oil may contain other contaminants that were either originally added as additives or that are picked up in the course of use. Some of these possible constituents of used oil include "heavy metals, sulfur, phosphorus, and total halogens"[129] as well as "water, non-combustible ash…and solids such as dirt and grit."[130] Additives purposefully added to the virgin motor oil are the source of the sulfur compounds as well as some of the metals, and additional metals accumulate from metal parts of the engine. Water also gathers in the motor oil because additives are designed to prevent its accumulation of water elsewhere in the engine, causing it to collect in the motor oil.[131] From the standpoint of chemical composition, it is important to note that at some point after used oil generation but before treatment or recycling of that used oil, batches of used oil from a variety of sources will be combined together.

Used Oil Transportation

Regulations at the state and federal level require that used oil be collected and disposed of properly after its initial use. Used oil generators (other than household generators) typically contract with a used oil transporter to transport the used oil to a used oil burner, processor, or re-refiner. Larger scale generators may require a daily pickup while others may only require pickups at lower frequencies, such as monthly or semiannually.[132] Some generators have regularly scheduled pickups while other will contact the transporter when pickup is required.[133] Used oil typically is collected by a tanker truck that can hold from 2,000 to 4,500 gallons, although collecting and transporting used oil from larger generators can require a larger truck.[134]

Used Oil Processing

Processing is least complex or intense of the available technologies to regenerate an oil product from used oil.[135] However, according to some in the industry, the processes employed are different at every facility.[136] Typically used oil processing produces oil that can be used as a fuel in cement kilns or other such industrial settings or a marine diesel oil.[137,138,139] However, used oil processing can be used to regenerate base stock for industrial oils or oil for use in asphalt applications.[140,141]

The extent to which used oil is processed and the specific technologies employed will depend on the use for which the product will be used. Some of the water and solid particles in the used oil may be removed by settling.[142] One or more filtration processes are typically performed on the used oil to remove additional solid materials.[143,144] As used oil processing generally entails minimal treatment to remove water and solids, fuel oil produced is considered to be of low quality and is typically blended with other higher quality fuels in order to reduce contaminant concentrations below those required by emissions requirements or other process needs.[145,146]

Marine diesel oils, on the other hand, are expected to be of higher quality,[147] and in that case, used oil processing may also include a distillation step to remove some of the water or lighter end fuels.[148] Distillation will also separate out the fuel oil from the heavier bottom hydrocarbons that can be sold or reused in asphalt applications.[149]

Used Oil Re-Refining

The re-refining process produces base oils that are comparable to virgin base oil that may be subsequently blended with other base oils and additives to produce motor oil and other lubricating products.[150,151] Only two re-refineries are currently in operation in the United States with a third in the planning stages. Safety-Kleen operates one re-refinery in East Chicago, Indiana with an operating capacity of 100 million gallons per year. Evergreen Oil operates the second in Newark, California with an operating capacity of 13 million gallons per year. PetroTex is planning to begin operating a re-refinery with an operating capacity of 15 million gallons per year in Texas in 2008.[152] Overall, the process in both

re-refineries in the U.S. involve two primary steps: several stages of distillation followed by hydrotreating.[153,154]

Operators of the Evergreen Oil refinery estimate that water comprises 4 to 6 percent of the used oil,[155] so their first stage of distillation is removal of this water as well as some light end hydrocarbons by flash evaporation.[156,157] Removal of this water also removes contaminants such as "sulfur compounds, ammonia, gasoline, alcohols, solvents and ethylene glycol from anti-freeze."[158]

More of the lighter end fuel oil components of the used oil are removed through vacuum distillation after flash evaporation.[159] Finally, the oil is subjected to a distillation column followed by thin film evaporators to separate various lubricating oil components from one another as well as from heavier hydrocarbon fractions that are undesirable in the final base stocks. Thin film evaporation is a variation on distillation in which the oil is fed down the inner surface of a heated tube. The lower boiling point fractions will evaporate first as the oil is heated, leaving the evaporator where they can be collected and cooled on a condenser.[160] The bottoms from this process contains both heavier hydrocarbon components as well as some of the metals and other additive residuals which tend to agglomerate with the heavier hydrocarbons.[161]

The final step in re-refining is hydrotreating of the lubricating oil fractions in which the oil is treated with hydrogen and a metal catalyst. [162,163] One of the results of this reaction is the saturation of some of the alkenes that are produced during engine use that are less prevalent in virgin lube oils.[164] Hydrotreating also helps "to remove sulfur, chlorine, oxygen, and other impurities from the oil and improves product stability, color and odor."[165]

The oil that emerges from this hydrotreating step can be used as a base oil. These re-refined base oils are comparable to the base stocks produced from the refining of crude oil. The base oils can be blended with other base oils and additives to produce motor oil or other lubricating oil products.[166,167]

The 2006 DOE study describes the technology that is planned for use in the newer PetroTex re-refinery in general terms. The description seems to indicate two stages of distillation or other separation processes designed to separate the lubricating oil fractions from water, impurities, and undesirable hydrocarbon fractions, followed by a hydrotreating process to both transform unsaturated hydrocarbons into saturated hydrocarbons as well as improving the aesthetics of the resulting base oils.[168]

Conclusions

The separation of used oil components from each other and from impurities and the manufacture of fuel oil and lubricating oil products are all technically feasible. The severity of the process undertaken depends entirely on whether the recycled oil product is intended to be used as a fuel oil or as a base oil for further production of lubricant oil products. The next chapter evaluates which of these processes is preferable and then

examines the challenges to the encouragement of that process in Texas and throughout the United States.

Notes

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Chapter 8. Challenges to Re-Refining in the United States

In spite of California's efforts to encourage re-use of used oil, one estimate is that only 14 percent of used oil in California is re-refined, even with one of only two re-refineries in the entire nation within the state. Texas, meanwhile, has not a single re-refinery within the state. The circumstances beg the questions: why are there only two re-refineries in the U.S.? How are those two economically viable? If regulators and policymakers want greater reuse of used oil, how can it be encouraged? This chapter explores those questions and looks to the future of re-refining in Texas.

Environmental and Economic Benefits of Used Oil Re-Refining

On the basis of energy recovery, potential environmental impacts, or benefits to the economy, reuse of used oil a fuel or a lubricant is preferable to either illegal dumping of used oil or landfilling of oil. Several studies have compared burning and re-refining to determine if one is preferable to the other. One recent U.S. Department of Energy (DOE) study found that re-refining could save 8.1 percent more energy than burning used oil considering (a) the energy consumed in transportation of used oil to its end user and in its processing before end use; (b) the processing saved by not having to produce a comparable replacement product, either fuel or lubricant; and (c) the energy value recovered. The study estimated that there could be a $63 million savings if used oil were re-refined instead of burned.[1] If the premium price of lubricating base oils is then compared to the price of heating and fuel oils (which average more than $1 per gallon cheaper), savings associated with increased re-refining could reach as high as $332 million annually.[2]

Two American studies and one European study evaluated the environmental consequences for both used oil burning and re-refining. The two American studies identified the impacts of the air emissions associated with used oil combustion and found re-refining advantageous because many of the contaminants end up in a solid form that poses a lesser risk than airborne contaminants.[3] Another study reported that while the risks of used oil combustion may be reduced by use of air pollution control, control equipment would have to be 99 percent effective before the environmental impact associated with burning would be equal to that of re-refining.[4] The European study evaluated the impacts in five areas including cancer risk, particulate emissions, and global warming; re-refining was better along four of these five dimensions.[5] The impact to global warming was found in some cases to be larger with burning and sometimes with re-refining, depending on what material is assumed to replace used oil if it were no longer burned.[6] While less than 15 percent of used oil that is collected nationwide is currently re-refined to allow for further use,[7] these studies conclude that re-refining should be preferred as the method for disposition of used oil.

Economic Feasibility of Re-Refining

Re-refining of all used oil has been estimated to save tens or even hundreds of millions of dollars annually, but the net economic benefit to society depends on the economic viability of individual re-refinery operations. In broad terms, there are three primary costs of re-refining: the costs of obtaining used oil, transportation of both the used oil and the finished product, and operating the re-refinery itself. A 2005 estimate of these costs is presented in Table 8.1.

Table 8.1
Estimate of Costs of Used Oil Re-Refining

	Price per gallon
Used oil feed	$0.30 – 0.45
Transportation of used oil	$0.10 – 0.30
Re-refinery operating costs	$0.40 – 0.75
Re-refinery overhead costs	$0.20 – 0.30
Transportation of re-refined oil	$0.10 – 0.30
Total cost	**$1.10 – 2.10**

Adapted from: United States Department of Energy (DOE), Office of Fossil Energy, *Used Oil Study to Address Energy Policy Act of 2005 Section 1838* (Washington, D.C., August 2006), pp. 9-10; and Mike Ebert, Safety-Kleen Systems, Inc., Non-Disposal Options for Used Oil," presented at a conference on "Cross-Border Environmental Management, at The University of Texas at Austin, March 2007.

The analysis assumed that the used base oil could be sold for $1.60 to $1.80 per gallon.[8] Therefore, the net result could range from a loss of $0.50 to a profit of $0.70 per gallon of used oil re-refined. This estimate is based on the operations of only one of the two re-refineries in the country. Other experts report prices as approximately $2.60 to $2.70 per gallon, meaning that re-refiners can earn significant profits. Table 8.1 represents an over-simplification, as the re-refining process produces multiple products, each of which is priced differently. When other products like "heavies" and "lites" are included, the true sales of a finished product could range from $3.15 to $3.85 per gallon.[9]

Each of the cost elements used in the calculation could vary. For example, some of the profitability of a re-refining operation may depend on the price of crude oil. The cost of acquiring used oil stock will depend largely on the market-clearing price for fuel oil,[10] as generators of used oil could instead opt to send their used oil to an operation that will eventually use the oil as fuel and are likely to opt for the most profitable disposition for their used oil. Therefore, the cost of obtaining used oil stock for re-refining purposes is likely to be correlated to the market price for fuel oil, and the price of fuel oil tends to track crude oil closely.[11] So, when the price of crude oil increases, the price of fuel oil tends to also increase.

The costs in Table 8.1 were estimated assuming crude oil costs approximately $45 to $55 per barrel.[12] Crude oil prices reached more than $75 per barrel in the summer of 2006,[13] but in 2007 prices have been approximately $50 to $65 per barrel.[14,15] Nevertheless, energy analysts expect the long-term price of crude oil to rise given more limited supply in future years and increasing consumption in developing economies such as China and India.[16]

The price that a used oil re-refiner can expect to be paid for the re-refined product (assumed in the study to be between $1.60 to $1.80) also has a relationship with crude oil, but the relationship is not as direct or apparent, and changes in base oil prices may lag behind.[17] Therefore, a change in crude oil prices could, for example, cause a spike in crude oil prices that is not reflected in the current price for base oil, meaning that a re-refinery could be unprofitable for periods of time that would have to be counterbalanced by the periods during which the enterprise is profitable. Some industry experts are critical of this economic hardship argument. Re-refined price estimates from the fourth quarter (October) of 2006 were approximately $2.31 per gallon.[18] If these prices are correct, the value of reused oil over the past several years has earned a profit for re-refiners.

Factors other than the price of used oil influence the price of used oil feed to a re-refinery. Although used oil is not considered a listed hazardous waste under federal used oil regulations, California regulates it as a hazardous waste. Operators of the Evergreen Oil re-refinery in California indicate that this hazardous waste classification lowers the cost of obtaining used oil,[19] presumably because the cost to a generator of arranging for an appropriate alternative disposition is high. The price of used oil feedstock may depend on the quality of used oil obtained, with greater oil content and higher quality oil translating into higher prices.[20] Recently more motor and lubricating oil also contain synthetic components, a trend that is expected to continue. Synthetic components generally command a premium over traditional used oil stock.[21] As a used oil re-refinery may collect used oil from a standard set of sources with whom the re-refinery has longer-term contracts, such contracts may dictate the price that will be paid, a price that may not track with the price of crude oil at all. Such contracts may be to the re-refinery's financial benefit or detriment depending on when they are negotiated and the subsequent trajectory of crude and fuel oil prices.[22]

Costs to transport both used oil and finished products will vary depending both on the unavoidable fluctuations in fuel costs (also tied to the price of crude oil) as well as the travel distance. Executives at Evergreen Oil offer the rule of thumb that it costs approximately $0.05 to transport one gallon of used oil for 100 miles, indicating that limiting the distance that used oil is transported can be a key to maintaining a profit margin.[23] However, it is important to note that Safety-Kleen, with re-refining capacity of more than 100 million gallons per year,[24] transports used oil from its operations in 47 states across the United States to its re-refining facility in East Chicago, Indiana.[25]

Re-refining operating and overhead costs would obviously be specific to each operation. These costs are likely to depend on the types and quality of the treatment processes

employed at the re-refinery. One opinion is that larger-scale plants would spread the fixed costs of a re-refining operation over a larger volume of oil that is re-refined, reducing marginal costs. However, there is a balance that must be struck, as a greater capacity re-refinery would also require the transport of more used oil to the facility, presumably from further away.[26]

One test of the profitability of used oil re-refining is that two re-refining operations in the United States currently operate at full capacity in spite of the variability and cyclical nature of the re-refining industry.[27] Some argue that oil prices must remain high to entice additional companies into the re-refining business.[28] Since crude oil prices are expected to increase in future years, it may be useful to evaluate what other barriers exist there are to the start up of additional successful re-refining operations.

Other Challenges of Re-Refining

Experts involved in various aspects of the used oil industry have identified any number of challenges that individuals or companies contemplating entering the re-refining business might face. One of these obstacles is simply the capital investment that is required to build a used oil re-refinery.[29,30] One estimate is that a used oil re-refinery with a capacity of 15 million gallons of base oil produced annually would require an investment of $17 to $21 million.[31] Investment in a re-refinery with capacity rivaling that of the existing Safety-Kleen facility of 100 million gallons or more would obviously require an even larger investment. Any new re-refinery would need to obtain regulatory or permit approval, a difficult process that has hindered the growth of both refining and re-refining capacity in the U.S.[32]

Both the supply and demand ends of production may also present obstacles to the success of re-refineries. Mike Ebert of Safety-Kleen observed that one of the biggest obstacles to success in the industry is having a steady guaranteed supply of used oil.[33] Safety-Kleen's oil supply draws from their used oil collection efforts from all of their own operations across the country. In addition, they also supplement used oil generated in house with arrangements with companies like General Motors (GM); Safety-Kleen collects used oil from GM and eventually also deliver re-refined product back to GM. Given these two substantial sources of used oil, they only occasionally have to rely on purchasing used oil from other generators or sources.[34] This need for steady supply of used oil highlights the intense competition for used oil that exists among used oil re-refiners, processors, and burners. Scott Parker, executive director of an association of liquid recyclers (the majority of whom recycle used oil) pointed out that one of the challenges of this industry is that there is a fixed supply of used oil generated each year that can serve as feed to re-refineries or that can be burned as fuel.[35]

One additional barrier to re-refining may be finding buyers for the re-refined product. Acceptance of re-refined oil is not automatic. Results of research in California found individual consumer resistance to the use or purchase of virgin oil blended with re-refined motor oil difficult to overcome.[36] One key reliable market has been government procurement. Instead of focusing on individual consumers, California state procurement

policies require that 50 percent of the money spent by state agencies on lubricating oil be spent on oil that contains at least 70 percent re-refined oil.[37,38,39] Executive Orders 13101 and 13149 require federal agencies to comply with the U.S. Environmental Protection Agency procurement guidelines, which require any motor oil labeled as "re-used" to contain at least 25 percent re-refined oil.[40,41,42] Some companies such as Coca-Cola and Ryder use re-refined oil in their truck fleets.[43] Under agreement with Safety-Kleen, General Motors buys back more than 5 million gallons of re-refined product.[44] General Motors originally mandated that its plants use more re-refined oil, setting targets of 5 percent in 2004, 10 percent in 2005, and 20 percent in 2006, with the hope that once plant managers and procurement personnel saw that re-refined oil was just as effective as virgin lubricating oil and that cost savings were possible, no mandates would be required beyond 2006. The policy has succeeded with use of re-refined oil now approaching 50 percent and some plants using more than 70 percent re-refined oil.[45] It is also possible that corporate and government acceptance of re-refined oil will help lead towards general acceptance for the use of re-refined oil. Both existing re-refineries in the U.S. operate at full capacity and find buyers for their re-refined oil, but the emergence of a new re-refinery would force the need to identify both large and small volume buyers.

Future of Re-Refining in Texas

These potential obstacles to the success of re-reining are important issues to contemplate because a new re-refinery is planned for the State of Texas in the coming years. PetroTex Hydrocarbons currently operates a pilot-scale demonstration of its technology at its research and development facilities in Addison, Texas, re-refining 200 gallons per day of used oil.[46] The company has acquired land in Texas to serve as the location of a full-scale re-refining facility and secured investors to fund construction. PetroTex is pursuing required air permits from the Texas Commission on Environmental Quality.[47] Assuming the successful completion of the permitting process, construction is slated to begin in the summer of 2007, and PetroTex aims to have the facility in operation by the end of 2008. The re-refinery will have a capacity of 1,500 barrels per day,[48] or more than 22,000,000 gallons per year (a barrel holds 42 gallons).[49] Company officials indicate that the company has secured both a supply of feedstock and destinations for the re-refined product.[50] The company is also optimistic for the prospects of establishing a "profitable and stable" business given both the anticipated crude oil prices in the future and the economical technology that they have developed.[51]

Safety-Kleen and Evergreen Oil have been able to operate financially viable re-refining operations in the U.S. for decades. However, re-refining capacity in the U.S. is limited to these two facilities. The promise of elevated and increasing crude oil prices in the coming years offers hope that these facilities and new ones will remain profitable operations. However, in spite of the general agreement that used oil re-refining is environmentally preferable and the potential profitability of the industry, used oil experts have identified other obstacles to the expansion of the industry. The next section offers recommendations to improve the system that is in place in Texas for the management of used oil, including means for supporting the efforts of PetroTex to bring re-refining to the state.

Notes

[1] United States Department of Energy (DOE), Office of Fossil Energy, *Used Oil Re-Refining Study to Address Energy Policy Act of 2005 Section 1838* (Washington, D.C., July 2006), pp. 7-4 - 7-5.

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[3] United States Department of Energy (DOE), Office of Fossil Energy, *Used Oil Re-Refining Study to Address Energy Policy Act of 2005 Section 1838* (Washington, D.C., July 2006).

[4] Ibid.

[5] Ibid., pp. 7-9 - 7-13.

[6] Ibid.

[7] Bob Boughton and Arpad Horvath, "Environmental Assessment of Used Oil Management Methods," Environmental Science and Technology, vol. 38, no. 2 (2004), p. 353.

[8] DOE, *Used Oil Study*, p. 9-10.

[9] Scotti Lee, facsimile to David Eaton, August 07, 2007.

[10] DOE, *Used Oil Study*, p. 9-10.

[11] Ibid.

[12] Ibid., p. 9-10.

[13] U.S. Department of Energy, Energy Information Administration, *Spot Prices for Crude Oil and Petroleum Products*. Online. Available: http://tonto.eia.doe.gov/dnav/pet/pet_pri_spt_s1_d.htm. Accessed: April 11, 2007.

[14] "U.S. Crude Prices," *Oil & Gas Journal*, vol. 105, no. 9 (March 5, 2007), p. 74.

[15] "World Crude Prices," *Oil & Gas Journal*, vol. 105, no. 4 (January 22, 2007), p. 64.

[16] Sam Fletcher, "FACTS: Oil market suffering from investment lull of 1990s," *Oil & Gas Journal*, vol. 104, no. 39 (October 16, 2006), p. 18.

[17] DOE, *Used Oil Study*, p. 9-9.

[18] John Denholm, Oil Changer Inc., letter to David Eaton (August 16,2007). Prices derived from North American Lubricants financial statements.

[19] Jacob Voogd and Louis Magnabosco, "Tipping the Scales for Rerefining," *Lubes'N'Greases*, vol. 12, no. 6 (June 2006), p. 16.

[20] Donald Smolenski, General Motors, Worldwide Facilities Group, Environment Services, "Life Cycle Management of Lubricant and Fluid Systems at GM" (presented at a conference on "Cross-Border Environmental Management," at The University of Texas at Austin, March 2007).

[21] DOE, *Used Oil Study*, p. 7-7.

[22] Ben Nagler, "Crude Attempts," *Recycling Today*, May 2004, p. 93.

[23] Voogd and Magnabosco, "Tipping the Scales for Rerefining," p. 16.

[24] DOE, *Used Oil Study*, p. 9-17.

[25] Interview by Amanda Van Epps with Mike Ebert, Vice President, U.S. Refinery Operations, Safety-Kleen Systems, Inc., Austin, Tex., March 1, 2007.

[26] Voogd and Magnabosco, "Tipping the Scales for Rerefining," p. 18.

[27] Scott Parker, Executive Director, NORA, "Developing Markets for Used Oil" (presented at a conference on "Cross-Border Environmental Management," at The University of Texas at Austin, March 2007).

[28] Nagler, "Crude Attempts," p. 92.

[29] DOE, *Used Oil Study*, p. 9-8.

[30] Parker, "Developing Markets for Used Oil."

[31] DOE, *Used Oil Study*, p. 9-9.

[32] Parker, "Developing Markets for Used Oil."

[33] Ebert interview.

[34] Ibid.

[35] Parker, "Developing Markets for Used Oil."

[36] CIWMB, Encouraging *Re-Refined Oil's Use at the Quick Lube: Re-Refined Oil Outreach* (Sacramento, Calif., October 2005), p. 25. Online. Available: http://www.ciwmb.ca.gov/Publications/UsedOil/61105009.pdf. Accessed: January 23, 2006.

[37] California Public Contract Code (CPCC), division 2, chapter 4, article 4, section 12203. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=pcc. Accessed: April 23, 2006.

[38] CPCC, division 2, chapter 4, article 4, section 12207. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=pcc. Accessed: April 23, 2006.

[39] CPCC, division 2, chapter 4, article 4, section 12209. Online. Available: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=pcc. Accessed: April 23, 2006.

[40] *Executive Order 13101* (September 14, 1998). Online. Available: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=1998_register&docid=fr16se98-113.pdf. Accessed: April 23, 2006.

[41] *Executive Order 13149* (April 21, 2000). Online. Available: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2000_register&docid=fr26ap00-130.pdf. Accessed: April 23, 2006.

[42] United States Environmental Protection Agency, *Comprehensive Procurement Guidelines: Re-Refined Lubricating Oil*. Online. Available: http://www.epa.gov/cpg/products/lubricat.htm. Accessed: April 23, 2006.

[43] Nagler, "Crude Attempts," p. 93.

[44] Smolenski, "Life Cycle Management of Lubricant and Fluid Systems at GM."

[45] Ibid.

[46] Telephone interview by Amanda Van Epps with Steve Burkhardt, PetroTex Hydrocarbons, April 10, 2007.

[47] Ibid.

[48] Telephone interview by Amanda Van Epps with Steve Burkhardt, PetroTex Hydrocarbons, April 10, 2007.

[49] U.S. Department of Commerce, National Institute of Standards and Technology, *NIST Guide to SI Units*. Online. Available: http://physics.nist.gov/Pubs/SP811/appenB8.html#B. Accessed: April 11, 2007.

[50] Burkhardt interview.

[51] Ibid.

Chapter 9. Conclusions and Recommendations

Several chapters in this report described and evaluated the federal, Texas, and California regulatory programs for used oil. Other chapters assessed the established technical processes used to treat used oil and prepare it for reuse, the relative merits of used oil re-refining, and some of the obstacles to the further development of the re-refining industry in the U.S. This chapter builds on that evidence to recommend that Texas develop policies to increase its collection and re-refining of used oil. Some of the actions that would accomplish these tasks are discussed below. Table 9.1 lists some policy options that could be enacted in Texas to increase used oil collection and re-refining.

Table 9.1
How Texas Could Increase Used Oil Collection and Re-refining

- Texas should use proceeds from the Used Oil Recycling Account to provide small grants to municipalities that will fund local used oil collection and public education programs, focusing on collection and education efforts that include used oil filters and motor oil bottles.
- To facilitate the tracking of used oil recycling, Texas could create a consistent registration and reporting system for used oil processors/re-refiners, burners of off-specification used oil, and used oil fuel marketers
- Texas could reduce the registration and reporting requirement for used oil collection centers so as to reduce an unnecessary burden on this important component of used oil collection from the public.

Source: Options generated by Amanda Van Epps.

This report has described two primary environmental considerations for used oil: the benefit of used oil recycling and reuse and the risk of contamination of waterways and drinking water supply from improper collection and disposal. This chapter seeks to develop recommendation to increase the likelihood of proper collection and disposal of used oil and its recycling. Energy, environmental, and economic impacts seem to indicate that used oil has its highest valued reuse through re-refining and reuse as a lubricating petroleum product. Similarly, the draft United States Department of Energy (DOE) report identified two areas that the used oil management system in any state should address: the proper collection of as much used oil as possible and the increased diversion of collected used oil to re-refining facilities.[1] Variation in laws, attitudes, and practices means that no one method for ensuring collection and proper recycling of used oil has been accepted as a standard for best practice, both worldwide and within the U.S.[2,3]

The two known groups of generators should be identified and addressed separately: commercial or industrial generators and household "do-it-yourselfer" generators. Industrial generators are not required to register with the Texas Commission on Environmental Quality (TCEQ) and are not tracked specifically, but they are regulated under the framework provided in the Texas Administrative Code. Similar to many of the

environmental regulations that businesses must comply with in the United States, the regulatory system in place relies on self-monitoring; Texas acts only if a violation is known to occur. For example, the recent DOE study makes the assumption that all used oil collected by so-called "quick lube" businesses that change oil in consumers' cars now comply with environmental regulations to collect and recycle used oil properly as required by law.[4]

The rise in oil prices over the last several years provides an incentive for businesses that generate used oil to collect used oil and sell it to an appropriate end user, either a used oil burner or a used oil re-refiner. For example, the Lower Colorado River Authority (LCRA), based in Austin, Texas, generates and collects between 50,000 and 80,000 gallons of used oil annually. The LCRA currently contracts with H&H Waste Oil, Inc., also of Austin, Texas, to collect LCRA's used oil from various facilities and transport it for re-refining or blending for marketing as fuel oil. Prior to 2004, LRCA had to pay for this service. With the rise in oil prices, H&H Waste Oil pays the LCRA for the entire volume of used oil that can be transported to a recycling facility.[5]

Household generators seem to present a greater risk for improper used oil disposal because they may not know the proper method for used oil disposal, and there is even less oversight of them than of industrial generators. The fraction of used oil generated by households that is properly collected is difficult to determine with certainty, but estimates vary from less than 20 percent[6] up to 40 percent.[7] This statistic is most likely in decline.[8] The California study estimated that 40 percent of all household used oil is collected, conceding that all efforts to quantify improper disposal will likely be underestimates because of any individual's reluctance to admit their behavior if they suspect it might not be preferable to the surveyor.[9]

Research performed in California identified two common-sense obstacles that can be addressed to improve used oil collection and recycling by household generators. First, rates of proper collection and disposal are highest when it is "very convenient" to the household generator.[10] Curbside collection of used oil is generally considered to be very convenient to consumers, but may not be widely available, while collection centers are only convenient for some consumers. The other important finding of the study was that if a consumer does not have a method of disposing of used oil that he deems "very convenient," the rate of improper disposal of used oil may be reduced if he learns about the potential environmental impact of improper disposal.[11]

The State of Texas collects $0.04 for every gallon of lubricating oil sold in the state, excluding those sales that are exempt because they involve a collection center that collects used oil from household generators. Receipts from this fee have historically totaled more than $1 million per year. As described earlier, the Texas Legislature earmarked these funds for two specific purposes in addition to the administrative costs of the used oil program: educating the public and funding for used oil collection centers. Both of these efforts were identified by research in California as important elements to help lower the improper disposal rate for household generators. Because Texas is so large and needs may vary (for example, from urban to suburban to rural areas or in

predominantly Spanish-speaking areas of the state), it might be advantageous to emulate some of the elements of the used oil grant program run by the California Integrated Waste Management Board. For example, the TCEQ could make per capita grants to cities and counties (or other units of government) to implement a local program to improve used oil collection and educate the public on the importance of proper disposal.

Other areas of potential focus could be on increased collection and recycling of both used oil filters and motor oil bottles, which could both increase the recycling of these resources and increase the proper collection of the used oil that is naturally disposed along with them. More than 425 million used oil filters are estimated to be generated in the U.S. annually.[12] Research in California in 2005 suggests that less than 5 percent of used oil filters generated by household generators are properly disposed of, and the majority are simply thrown in the trash.[13] Typical estimates hold that approximately two to eight ounces of oil are left in an oil filter when it is disposed, but this California report argues that that figure is a very low estimate, with the real value approaching eleven ounces, or 0.083 gallons per filter.[14] Accordingly, the CIWMB estimates that the improper disposal of used oil accounts for more than 2 million gallons of used oil not collected annually just in California.[15] The rates of proper filter collection in Texas and the rest of the country are not known, but these data document that millions of gallons of used oil, along with the recyclable oil filters themselves, are being thrown away annually. One way to reduce improper disposal by home generators is to charge a deposit on each quart of motor oil and oil filter purchased. For example, a state could require a one dollar deposit on each quart of oil sold, and when the consumer returned their used oil, they would receive $0.90. The remaining ten cents would be a management fee.[16]

Scotti Lee, Ph.D., president of the American Oil Change Association and owner of Oil Change Express in New Castle, Delaware, has led efforts in Delaware to educate both quick-lube operators and the public about the need and ability to recycle oil filters. He estimates that 96 percent of used oil filters are being kept out of landfills as a result of these efforts; he reports that the oil collected has enabled the purchase of defibrillators for use by fire departments and other public servants.[17] Dr. Lee has tried to address a similar problem with the disposal of motor oil bottles after the oil has been poured into a car. He estimates that 1.4 billion quart bottles are manufactured annually, and 0.007 gallons of oil remains in the bottle after four hours of draining, which would account for the loss of 9.8 million gallons nationally of oil that is not being properly disposed of or recycled in any manner.[18] Furthermore, the bottles themselves are recyclable.[19] Education of the general public using funds from the Used Oil Recycling Account could only help to increase the proper collection of used oil.

As stated previously, both re-refineries in the U.S. operate at capacity,[20] and some suggest that one of the primary obstacles to increased re-refining of used oil is limited capacity.[21] When the ratio of re-refining capacity to total lubricating oil sales are compared, the United States has only one-third the re-refining capacity of Europe.[22] Certainly, financial assistance in the large capital outlay required for construction and start-up of a re-refinery as well as a more favorable permitting process may encourage the expansion of the re-refining industry nationally. Even without those incentives, Texas

has the prospect of a new re-refining facility currently expected to be operational in 2008.[23]

Both an adequate supply of used oil and a market for the re-refined product seem essential to ensure the viability of a Texas re-refinery. Multiple experts within the used oil business identified an adequate and steady source of used oil as one of the challenges of maintaining a viable re-refining operation. Governments including the State of California, the U.S. federal government, and the Texas Department of Transportation all indicate a preference for the purchase of re-refined oil to increase demand for the recycled product and set the standard that re-refined motor oil is as effective as traditional motor oil. A draft DOE report discussed the possibility of modifying existing executive orders to require the sale of used oil generated by the federal government to re-refining operations,[24] but no executive order has yet been enacted like that requiring the purchase of used oil. However, given the prospect of a new re-refinery in the state, one approach could be to require Texas county or state government agencies to divert their used oil to re-refineries and buy a certain percentage of re-refined motor oil. Every agency in Texas may not always be able to sell their used oil to a re-refinery, nor will re-refined motor oil always be available for purchase depending on the capacity of the re-refining industry in Texas, but these options could be exercised when available. One possible situation might be an agreement comparable to that between Safety-Kleen and General Motors, where General Motors both sells its used oil to Safety-Kleen and purchases back re-refined oil from them. This agreement has proved valuable to Safety-Kleen to ensure its used oil supply is adequate, but has also improved the amount of re-refined product that General Motors consumes and even has saved GM money.[25]

Educating household generators, encouraging proper collection of as much used oil as possible, and expanding collection of used oil to include used oil filters and motor oil bottles will all increase the amount of used oil available for both used oil processing and re-refining. The supply of used oil is fixed, and when used oil is diverted to the processing route, it is no longer available to a re-refiner. Scott Parker of NORA suggested that the capture of used oil is the largest growth opportunity for used oil recycling businesses.[26]

The existing data collection and reporting system in Texas makes it hard to track used oil or its recycling because so little data are collected. Only two types of used oil handlers report to TCEQ with any regularity: used oil collection centers and used oil processors/re-refiners. Even with these data, it is not easy to estimate either what fraction of used oil is being captured by collection centers or eventually being processed or re-refined. Used oil can bypass either one of these points in the system. For example, used oil can be sold directly from an industrial generator to a used oil fuel marketer and then to a burner of off-specification used oil. In such a case, Texas used oil officials could have no factual basis to estimate the fraction of used oil not being properly collected and disposed of.

A first step to adequate data collection could be to track sales data. If TCEQ could know how much oil is sold in Texas, then it could estimate the volume of used oil that might be

recovered. Used oil could be counted if the fee on the first sale of motor oil is collected. Such a process would require that those who are exempt from the fee also report the volume sold, even if they do not have to pay the fee, as well as some assumption about the percentage of lubricating oil used in Texas that is motor oil.

A second step toward improved used oil management in Texas would be to require used oil processing/re-refining facilities to continue to report to TCEQ the volume of used oil processed or re-refined. Texas could also require used oil fuel marketers to report the volume of used oil that they claim is on-specification and used oil fuel burners to report the volume of used oil that they burn. The frequency for each of these reporting requirements should be the same; currently, processors/re-refiners report biennially.

The current system of annual reporting required of used oil collection centers will provide a means for tracking Texas's efforts at improving collection of oil generated by households. However, if no additional effort is made to target household generators and support used oil collection centers, then the requirement—that used oil collection centers register biennially and report annually—is serving no public purpose and only placing a burden on collection centers that perform a public service and capture used oil that might otherwise be improperly disposed of. Texas should create a more efficient regulatory system.

Conclusions

The challenges and promise of used oil received much attention more than a decade ago when the federal used oil management standards were first enacted and used oil was perceived to be a large threat to the environment and the public. A certain level of public awareness has been achieved and some progress has been made in the collection of used oil from commercial and industrial generators, but challenges remain. Interest in the recycling and reuse of used oil might resurge as the price of crude oil remains high, concerns about U.S. dependence on foreign oil increase, and more people begin to realize that dumping or burning of used oil wastes a precious resource that could be reused beneficially. If the price of crude oil remains high as expected, market forces can be expected to cause some favorable changes in the market, such as possibly the growth of the re-refining industry. However, given the potential environmental impacts from the improper disposal of used oil by household generators and others as well as the national security implications of continued consumption of large amounts of foreign oil, there is an important role for government to play in addressing this issue. The next chapter describes and evaluates used oil collection in Mexico, including the relevant legislation and the existing systems for data collection.

Notes

[1] United States Department of Energy (DOE), Office of Fossil Energy, *Used Oil Study to Address Energy Policy Act of 2005 Section 1838* (Washington, D.C., July 2006), p. 8-1.

[2] DOE, Office of Fossil Energy, *Used Oil Re-Refining Study to Address Energy Policy Act of 2005 Section 1838* (Washington, D.C., July 2006), p. 3-1.

[3] Ibid., p. 6-4.

[4] Ibid., p. 5-2.

[5] Interview by Amanda Van Epps with Jobaid Kabir, Ph.D., P.E., Manager, Environmental Compliance, Lower Colorado River Authority, Austin, Tex., April 5, 2006.

[6] DOE, *Used Oil Study*, p. 5-1.

[7] California Integrated Waste Management Board (CIWMB), *"To the Greatest Extent Possible": Do-It-Yourselfers and the Recovery of Used Oil and Filters* (Sacramento, Calif., October 2005), p. 27. Online. Available: http://www.ciwmb.ca.gov/Publications/UsedOil/61105008.pdf. Accessed: January 23, 2006.

[8] John Denholm, Oil Changer, Inc., letter to David Eaton (August 16, 2007).

[9] Ibid., p. 4.

[10] Ibid., pp. 56, 62.

[11] Ibid., pp. 67-68.

[12] CIWMB, *Used Oil and Filter Facts* (Sacramento, Calif., May 2006). Online. Available: http://www.ciwmb.ca.gov/publications/usedoil/61006006.doc. Accessed: April 11, 2007.

[13] CIWMB, "To the Greatest Extent Possible," p. 97.

[14] Ibid.

[15] Ibid.

[16] Scottie Lee, facsimile to David Eaton, August 07, 2007.

[17] Scotti Lee, Ph.D., Owner, Oil Change Express, New Castle, Delaware (presented at a conference on "Cross-Border Environmental Management," at The University of Texas at Austin, March 2007).

[18] Ibid.

[19] Ibid.

[20] Scott Parker, Executive Director, NORA, "Developing Markets for Used Oil" (presented at a conference on "Cross-Border Environmental Management," at The University of Texas at Austin, March 2007).

[21] DOE, *Used Oil Study*, p. 8-1.

[22] DOE, *Used Oil Study,* p. 3-1.

[23] Ibid., p. 10-15.

[24] DOE, *Used Oil Study*, p. 9-1.

[25] Donald Smolenski, General Motors, Worldwide Facilities Group, Environment Services, "Life Cycle Management of Lubricant and Fluid Systems at GM" (presented at a conference on "Cross-Border Environmental Management," at The University of Texas at Austin, March 2007).

[26] Parker, "Developing Markets for Used Oil."

Chapter 10. Used Oil Management in Ciudad Juárez

This chapter describes what is known about used oil handling standards and management of used oil in the Mexican portion of the El Paso-Ciudad Juarez area. This chapter also describes data gaps that exist related to management of used oil in the region and options for future Mexican used oil data collection.

Federal Laws and Regulations on Used Oil in Mexico

The handling and management of used oil in Mexico is governed primarily by the General Law of Ecological Balance and Environmental Protection (the General Law), most recently updated in 2006.[1] This law is complemented by the General Law for the Prevention and Integral Management of Waste published in the Federal Official Gazette in 2003 (the 2003 Waste Law).[2] These laws contain similar provisions; both laws guarantee the right of every person to an adequate environment.[3] The objectives of the 2003 Waste Law is more specific than the General Law. These objectives are described in Table 10.1.

Table 10.1
Objectives of the General Law Regulations

Category	Objective
Framework	• Apply the principles of assessment, shared responsibility and integrated waste management to achieve social, economic, technological, and environmental efficiency. • Determine the principles that should be considered in the generation and management of the waste. • Prevent waste generation. • Promote the assessment of waste as well as the development of markets for byproducts to achieve environmental, economic, and technological efficiency. • Promote the cooperation of all social sectors in the prevention of waste generation and adequate environmental management.
Regulations	• Regulate the generation and management of hazardous waste. • Formulate a basic and general classification of waste that permits standardized inventories to facilitate its estimation and management. • Define the responsibilities of the producers, importers, exporters, merchants, consumers and authorities of the different levels of government, as well as of the providers of waste management. • Create a system of information related to the generation and management of hazardous waste, municipal solid waste, and industrial waste. • Create a system of information for contaminated and remediated sites. • Prevent land contamination by the proper management of materials and waste. • Regulate the import and export of waste. • Support research, scientific development, and technological innovation to reduce the generation of waste and to design alternatives

Category	Objective
	for its treatment with a preference for cleaner processes. • Establish enforcement measures to guarantee compliance with the waste law, including imposition of necessary sanctions.

Source: 2003 Waste Law published in the Federal Official Gazette in October 8, 2003.

More specifically, this law is intended to prevent the generation of hazardous waste.[4] However, the handling of hazardous waste is regulated, including its use, collection, storage, transport, re-use, recycling, treatment and final disposition.[5] The law also seeks to assess and manage hazardous waste to prevent the release of this waste or to remediate contamination caused by a release.[6] The Mexican Congress passed the 2003 Waste Law[7] to regulate all aspects of waste management, including the hazardous waste category which covers used oil. The law is divided into seven titles as shown in Table 10.2. Table 10.3 lists terminology used in the law, which are retained the current law.

Table 10.2
Titles of the Law

Titles	Definitions
I	Objective and Definitions
II	Coordination and Distribution of Federal, State, and Municipal Jurisdiction
III	Waste Classification
IV	Plan for Prevention and Integrated Management of Waste
V	Integrated Management of Hazardous Waste
VI	Plan for Prevention and Integrated Management of Municipal Solid Waste and of Industrial Waste
VII	Importing and Exporting of Hazardous Waste.

Source: 2003 Waste Law published in the Federal Official Gazette in October 8, 2003.

Table 10.3
Definition of the Terms Used in the Law

Term	Definition
Waste Reuse	Actions whose objective is to recover the economic value of the waste by means of its re-utilization, re-manufacture, re-design, recycling, and recovery of materials
Generation	Action that produces waste through the development of manufacturing processes or of consumption
Generator	Place or person that produces waste, through the development of manufacturing processes or consumption
Integrated Waste Management	• Group of interrelated regulatory actions of operation, finances, administration, social, education planning, monitoring, supervision and evaluation. • Regulatory actions created for waste management, from generation to its final disposition, in order to achieve environmental benefits. • The purpose of these actions are the economic optimization of management, and its social acceptance, responding to the needs and circumstances of each locality or region

Waste	Material or product disposed by its owner or possessor and that is found in solid or semisolid state, or is a liquid or contained gas in containers or deposits, and that can be susceptible to be evaluated or requires to be held to processing or final disposition according to this Law and other codes
Industrial Waste	Waste generated in manufacturing processes that do exhibit hazardous characteristics and are not municipal solid waste (unless generated by large generators of municipal solid waste)
Hazardous Waste	• Waste that exhibit any of the characteristics of corrosivity, reactivity, exclusivity, toxicity, flammability, or that contain infectious agents that makes them dangerous. • Containers used to store hazardous waste after the waste has been transferred elsewhere. • Land contaminated by hazardous waste.
Secretary	The Secretary of the Environment and Natural Resources
Shared Responsibility	Principle recognizing that municipal solid waste and special waste are generated from the execution of activities that satisfy needs of the company, by means of production type value chains, process, bottled, distribution, consumption of products and consequently, its management is a social responsibility and requires the joint participation, coordination and differentiation of producers, distribution, consumers, users of byproducts, under a feasible market plan with social, economic, technological, and environmental efficiency.
Re-use	Utilization of a material or residue previously used, without a treatment or recycling process.
Contaminated Location	Location, place, space, ground, body of water, installation or any combination of these that has been contaminated with materials or waste that by their quantities and characteristic pose a risk to human health or other living organisms.
Treatment	Physical, chemical, biological or thermal processes that change the characteristics of residues and their volume to reduce their danger

Source: 2003 Waste Law published in the Federal Official Gazette in October 8, 2003.

Hazardous waste generators are divided into categories based on the volume of waste generated annually in order to create hazardous waste inventories, facilitate decisions based on risk, and improve waste management. Table 10.4 identifies regulations for existing hazardous waste generators in each of these categories. This law states that hazardous waste generated by large and small generators is regulated by the federal authorities, but state and local authorities are allowed to regulate micro generators (those who generate less than 400 kilograms per year) of certain hazardous wastes including used oil if there is a prior agreement issued between federal and state governments.[8]

The law states that a generator is responsible for the handling and final disposition of hazardous wastes.[9] Used oil generators must meet infrastructure requirements to comply with Mexican waste management regulations.[10] If a generator contracts with companies permitted by SEMARNAT to handle hazardous wastes, the responsibility for the hazardous waste will shift from the generator to the permitted firm when the waste is delivered to this firm.

Table 10.4
General Regulations for Hazardous Waste Generators

Generator Category	Requirements
Large	• Must register with the Office of the Secretary. • Must submit a hazardous waste management plan to the Office of the Secretary. • Must maintain records and submit an annual report describing hazardous waste generation and management. • Must obtain environmental insurance.
Small	• Must register with the Office of the Secretary. • Must maintain records and submit an annual report of the volume of hazardous waste generated and management methods. • Must store wastes according to management plans.
Micro	• Must register with the corresponding government authorities at the federal or municipal level. • Must maintain management plans for the hazardous wastes that they generate based on the conditions set by the authorities. • Must transport their own hazardous waste to the authorized collection centers or arrange for authorized transportation to these centers.

Source: 2003 Waste Law published in the Federal Official Gazette in Chapter II, October 8, 2003.

The 2003 waste law also introduced the concept of a "management plan" to reduce hazardous waste generation and increase reuse and recycling, including used oil. The purpose of Hazardous Waste Management Plans is to describe internal processes to minimize hazardous waste generation and ensure compliance with legal provisions and regulations. The entities required to implement hazardous waste management plans include generators, importers, exporters and distributors of certain hazardous wastes (listed in Article 31, Parts I through XI); generators of certain other hazardous wastes (listed in Article 31, Part XII through XV); and large quantity generators, importers, exporters and distributors of municipal solid waste and special waste.[11] According to these requirements, all large generators of used oil as well as small generators (those that generate more than 400 kilograms but less than 10 tons per year of used oil) were required to submit a Management Plan prior to January 2006. The management and disposal of hazardous waste may create liability for generators, but these hazardous waste management plans also provide a means for them to limit their liability. Table 10.5 summarizes the required components of these hazardous waste management plans. Table 10.6 summarizes the storage and disposal requirements for hazardous waste including used oil.

Table 10.5
Required Components of the Waste Management Plan

• Procedures for waste collection, storage, transportation, treatment and shipment to recycling, and final disposal. • Strategies and methods to communicate to customers, the actions than needs to be implemented when returning the hazardous waste to the supplier or to the collection center. • Strategies and methods to communicate to customers the actions than need to be implemented when returning hazardous waste to the supplier, in order to prevent risks. • Responsible parties involved in plan formulation and execution.

Source: 2003 Waste Law published in the Federal Official Gazette in October 8, 2003.

Table 10.6
Hazardous Material Storage and Disposal Requirements for Used Oil

Activity	Requirements
Storage	• Mixture of hazardous waste with other materials should be avoided to prevent contaminating them and not to cause reactions that can increase risk to human health or the environment. • Containers that contained hazardous waste are also considered hazardous waste, except for those processed for reuse, recycling or final disposition. • Containers used to store hazardous waste should never be employed to store water, food or other products intended for consumption by humans or animals. • Hazardous waste may not be stored for more than six months after generation.
Disposal	• Any generator that recycles hazardous waste at the location of generation must prepare a technical report that includes the procedures, methods or techniques by which the hazardous waste will be recycled. This report should be submitted to office of the Secretary 30 days prior to its recycling. • Any disposal method that releases contaminants to the environment or otherwise poses a risk to human health requires prior authorization from the office of the Secretary. • Recycling of waste must comply with legal dispositions in matter of environmental impact, risk, prevention of the contamination of the water, air, ground and any other applicable matter. • The methods or techniques used to carry out physical, chemical or biological treatment of hazardous waste should be reported to the office of the Secretary with a proposal of measures to prevent or to reduce toxic releases. • When a release occurs, those responsible for the toxic substance are required to prevent, reduce or control the leakage. • Representatives of the different social sectors will participate in the formulation of plans and actions that will be conducted for prevention, reduction of contamination due to the management of hazardous wastes. • Incineration and heat treatment of hazardous wastes should be done in accordance with the Mexican laws and regulations. • Incineration and heat treatment of hazardous wastes should comply with the Mexican law in order to verify a low emissions of contaminants to the environment, particularly of those that are toxic.

Source: 2003 Waste Law published in the Federal Official Gazette in Chapter IV (October 8, 2003).

SEMARNAT is authorized to promote, prevent and reduce the generation of hazardous waste and stimulate reuse and recycling. The 2003 Mexican waste law allows hazardous waste from one source to be re-used as an input for another process if it is justified after consideration of the economic and environmental risks and benefits. Any hazardous waste that is used, treated or recycled by an entity other than the generator is subject to regulation. If a hazardous waste is transported to a different place from where it was generated, its transportation has to comply with hazardous waste regulations.

Beyond the waste law, there are also several SEMARNAT standards regulating the management of hazardous waste (and therefore used oil), as summarized in Table 10.7. Included among these standards are specifications for containers, barrels, and cans used to store hazardous waste; procedures to determine whether two or more hazardous wastes are compatible; a prohibition on common storage of incompatible waste; and requirements for hazardous waste storage facilities.

Table 10.7
Relevant SEMARNAT Hazardous Waste Standards Related to Used Oil

Title and Date Published	Description of the Standard
NOM-052-SEMARNAT-2005 June 23, 2006	Characteristics and list of thresholds above which a waste is considered hazardous due to environmental toxicity
NOM-055-SEMARNAT-2003 November 3, 2004	Requirements for hazardous waste storage facilities
NOM-056-SEMARNAT-1993 October 22, 1993	Design and construction standards for hazardous waste storage structures
NOM-057-SEMARNAT-1993 October 22, 1993	Design, construction and operating standards for hazardous waste storage facilities
NOM-058-SEMARNAT-1993 October 22, 1993	Operating requirements for the hazardous waste storage facilities
NOM-002-SCT-2003 December 3, 2003	List of commonly transported hazardous substances and materials
NOM-117-SEMARNAT-1998 November 24, 1998	Specifications for installation and maintenance of systems for the transportation and distribution of hydrocarbons and petrochemicals in liquid and gaseous state that are transported on existing terrestrial paths in agriculture, cattle raisers, and uncultivated zones.
NOM-138-SEMARNAT/SS-2003 March 29, 2005	Allowable Thresholds of hydrocarbons in soils and soils remediation.

Source: SEMARNAT, *Gestión de Materiales, Residuos y Actividades de Riesgo*. Online. Available: http://www.semarnat.gob.mx/leyesynormas/Pages/normasoficialesmexicanasvigentes.aspx Accessed August 13, 2007.

Table 10.8 defines some of the terminology used in the norms, and the regulations for hazardous waste storage facilities are summarized in Table 10.9. These standards are not specific regulations for used oil *per se* but for hazardous waste in general. In accordance with current SEMARNAT policy, Mexico's Federal Government has not issued standards or regulations specific to used oil, since it is considered a hazardous waste without exception and therefore covered by Mexico's hazardous waste regulations; however this policy could be changed in the future.

Table 10.8
Definition of Standard Terminology

Term	Definition
Confinement cell	The area created inside a facility designated for permanent storage of hazardous waste
Complementary construction	The construction of support structures needed to operate a storage facility properly
Treatment cell	The area inside a storage facility used to reduce the volume and toxicity of hazardous waste

Source: SEMARNAT, Mexican Official Standard *NOM-056-SEMARNAT-1993. Published in the Federal Official Gazette in* July 2, 1993.

Table 10.9
Mexican Official Norms and Specifications for Storage Facilities

NOM-055-SEMARNAT-2003 (November 3, 2004)
A storage facility must comply with the following specifications among others:
• There must be at least 100 meters of land between the edge of the confinement cells and the edge of the facility.
• The facility should not be located inside protected natural areas.
• The facility should be located at least 1,000 meters from human settlements.
• The facility should be located at least 1,000 meters from facilities such as airports, hospitals, prisons, schools, water wells, or buildings of historical significance.
NOM-056-SEMARNAT-1993 (October 1993)
Requirements for the design and construction of complementary structures of a hazardous waste storage facility include the following:
• Temporary storage areas may be used to collect hazardous waste when pretreatment is necessary, when there are no confinement cells available, or when permanent storage is not otherwise possible immediately.
• This area must have a minimum capacity of seven times the average volume of hazardous waste received daily and must to have enough cells to separate different waste types and accommodate incompatible hazardous wastes.
• The area should be covered with inflammable material, a fire kit must be available, and platforms for unloading packages and packing must be present.
NOM-058-SEMARNAT-1993 (October 1993)
The requirements for the operation of a hazardous waste storage facility include the following:
• A log book must be maintained to register arrivals and departures of hazardous waste shipments and the vehicles transporting them.
• A numbered registration book with an inventory of the weight of hazardous waste must be maintained.
• A registration book containing laboratory test results must be maintained.
• A site map showing the areas, cells, and treatment of the hazardous waste must be available.
• A monitoring registration book numbered in order must be maintained to track any incidents that occur at the collection center

Source: SEMARNAT, *Gestión de Materiales, Residuos y Actividades de Riesgo.* Online. Available: http://portal.semarnat.gob.mx/semarnat/portal. Accessed: December 1, 2005.

State Laws and Municipal Regulations

A Mexican state may authorize and manage hazardous waste generated or handled by micro-generators, and it may also impose penalties established in accordance with federal, state and municipal laws, as long as a corresponding agreement exists between the state and SEMARNAT. In addition, a state may create a registry system for hazardous waste collection, storage, transport, treatment, and final disposition. The municipalities are expected to coordinate the installation of equipment that will control contaminant emissions.

The Law of Ecological Balance and Environmental Protection of the State of Chihuahua outlines objectives to increase social participation in the reduction, collection, reuse, treatment, and management of hazardous waste. Among these goals are to: generate and exchange information regarding hazardous waste management; promote training to reduce and control waste; support research and technological development; stimulate the creation of infrastructure for effective waste handling; and encourage social awareness on the safe handling of hazardous waste.[12] The State of Chihuahua and the Municipality of Juárez have worked with certain industries, government, academic institutions, nonprofit organizations and service providers[13] to reduce, collect, reuse, treat, and manage a few hazardous wastes including used oil.

Used Oil Data Collection

Limited data are available on the generation, handling and disposal of used oil in Cd. Juárez. SEMARNAT does collect information on companies authorized to reuse, incinerate, or recycle used oil in Mexico, including the volume of used oil handled by these companies. Table 10.10 summarizes the number and capacity of these companies operating in different geographical areas within Mexico. More detailed information on those companies operating in Cd. Juárez is presented in Appendix D.

Table 10.10
Companies Authorized to Handle Used Oil in Mexico

Geographical Area	Reuse Oil		Incinerate used oil and other hazardous wastes		Recycle Used Oil	
	Number of Companies	Capacity (ton/year)	Number of Companies	Capacity (ton/year)	Number of Companies	Capacity (ton/year)
Mexico Federal District	1	0.00186	1	365		
Durango	1	20.64				
Nuevo Leon			1	11,050	4	1,270
San Luis Potosi					2	1,000
Veracruz					2	45,756

Source: Reused from unpublished data from SEMARNAT.

In 2004, 526 hazardous waste generators in Mexico were registered with SEMARNAT;[14] however, it is believed that many hazardous waste generators remain unregistered. It is believed that unregistered generators are more likely to illegally dispose of wastes.[15] Generators are required to report hazardous waste generation using a format called Annual Operation Identification (Cédula de Operación Anual, or COA), a requirement only recently implemented. The generators were to report hazardous waste generated in 2004 by July 2005, and they were to report hazardous waste generated in 2005 by April 2006. As of 2006, there were 28 companies in Mexico authorized to collect and transport hazardous waste and 16 companies authorize to store hazardous waste temporarily.[16] Although used oil commonly is transported,[17,18] only two companies in Chihuahua were authorized by SEMARNAT as of the year 2000 to manage industrial hazardous waste in temporary storage, and no Chihuahua companies had been authorized to recycle hazardous waste.

With so few companies authorized to store hazardous waste, it appears that Mexico lacks infrastructure for recycling, treatment, and final disposal of hazardous waste. Therefore, it is believed that disposal of used oil is the most common final disposition for used oil.

Possible Future Practices to Recycle Used Oil

Project staff asked two professionals experienced in issues of used oil in Mexico about future options, Alma Leticia Figueroa Jimenez, Professor of Biology at the Institute of Biomedical Sciences at the Autonomous University at Juárez along with Elva Denisse Varela-Olivas, attorney from Baker and McKenzie.[19] Professor Figueroa believes that increasing oil re-use and recycling could begin with gathering data about current used oil generators such as through a survey to understand the quantity and nature of used oil generation. Professor Figueroa and Ms. Varela have identified several obstacles to the greater reuse and recycling of used oil. For example, manufacturing facilities may need to adapt their facilities before they can burn used oil. Another obstacle is the fluctuation in natural gas prices that can make the purchase and sale of used oil at times unprofitable

given the lag between when used oil may be generated and the time when that used oil might make its way to a potential buyer wanting to use it as a fuel.

A frequent comment from knowledgeable Mexican used oil professionals is that Mexico could benefit if it would collect data about used oil generators to make sure they are registered, to identify available alternatives for recycling and re-use of used oil, and to design an educational program for all oil users, producers, and the general public. From that information, several actions need to be taken. Table 10.11 lists a number of actions that could be taken in Cd. Juárez to increase used oil collection, reuse, and recycling. Table 10.12 lists possible improvements in used oil practice in Mexico. Some of these strategies are listed in the following recommendations in Table 10.13.

Table 10.11
How Mexico Could Increase Used Oil Collection, Reuse, and Recycling

• Focus on supply driven strategies that would capture more oil, without necessarily generating more oil.
• Educate the general public about the environmental implications of dumping or burning used oil.
• Create policies that focus on the state and local level to build a network of oil generators, breaking down barriers; this could create an open exchange of information to talk about incentives and ways to recycle used oil.
• Create government waste management plans for micro and small generators which could be used a legal instrument to encourage the control and reduction of amount of used oil generation.
• Every large used oil generator (who generates more than 10 tons per year) ought to create a management plan in accordance with Mexico's waste law. • Management plans of large used oil generator could consider and include collaborations with other generators, services providers, Mexican authorities or other groups which are not duly enforced by said law in order to eventually become Mexican law easier to enforce.
• Mexico's waste law will allow co-processing option if it becomes an economic option in recycling becomes available in the Mexican market, despite Mexico's waste law establishes restrictions on fuel burning and co-processing.
• Encourage the establishment in Juárez of public collection centers where household do-it-yourselfer generators could take their used oil for proper disposal, reuse, or recycling.

Source: Developed by Alma Leticia Figueroa Jimenez, Professor of Biology, El Instituto de Ciencias Biomedicas, La Universidad Autonoma de Juárez and Elva Denisse Varela-Olivas, Attorney, Baker and McKenzie.

Table 10.12
Possible Used Oil Practices in Mexico

• Reduce the generation of used oil by adequate maintenance of vehicles.
• Facilitate collection of used oil jointly from small generators.
• Identify used oil generators not registered with SEMARNAT and track the volumes of used oil generated by these businesses.
• Teach used oil generators how to collect used oil properly for its re-use. Teach proper used oil practices to businesses that handle used oil to reduce the amount of used oil improperly disposed of and increase used oil collection.
• Reuse used oil as an alternative fuel.
• Create economic incentives to companies to abide by Mexican waste management laws. By inducing changes that would both facilitate the collection and adequate recycling of used oil and generate resources to develop environmental infrastructure.
• Integrate used oil management into a strategy for sustainable development by inducing recycling and final disposal of used oil so as to decrease contamination and increase recycling and re-use of it.
• The Mexican government could subsidize recycling by paying a small amount of money to small private companies for collecting used oil.
• Where generation of used oil cannot be avoided, used oil should be recovered and re-used.
• The U.S. could import and treat Mexican used oil, if Mexico does not have the adequate facilities to treat used oil properly.
• Economic instruments like waste taxes could be used to reduce land filling and inappropriate used oil disposal to support a state-of-the-art treatment recovery and recycling of waste.

Source: Developed by Sonia Uribe and Alicia Williams from the Lyndon B. Johnson School of Public Affairs, The University of Texas at Austin.

Table 10.13
A Used Oil Management Strategy in Ciudad Juárez

Strategy 1: Prevent Used Oil Generation		
Legal and Political Action	**Current Situation**	**Possible Actions**
Set quantitative targets for reducing and recovering used oil	Not in place	Put in place
Encourage the reduction of used oil generation, and increase recovery of used oil by means of recycling, re-use or the use for byproducts	Not in place	Increase community sensitivity to change behavior regarding generation of used oil
Ensure that used oil is recovered or disposed of safely, and prohibit the dumping or uncontrolled disposal of it	In place	Recruit illegal oil mechanic shops to become legal in order to enforce used oil regulations
Prepare waste management plans	In place	Enforce management plans
Integrate the principle of producer responsibility in all future measures on a case-by-case basis	Not in place	Increase community awareness

Strategy 2: Prevention of Impact on Environment		
Legal and Political Action	**Current Situation**	**Possible Actions**
Collect and dispose of waste oils safely and prohibit any discharge of waste oils into inland surface waters, groundwater, etc.	In place	The Ciudad Juárez Government needs to enforce law
Strategy 3: Recovery		
Legal and Political Action	**Current Situation**	**Possible Actions**
Encourage re-use systems to take the necessary measures in order to attain certain targets of recovery and recycling of used oil	Not in place	Set up quantitative targets of recovery and recycling of used oil
Propose specific targets of re-use, recycling and recovery of used oil	Not in place	Set up quantitative targets of re-use, recycling and recovery of used oil
Develop a recycling industry that uses modern technologies and methods that promotes recyclables of used oil	Not in place	Put it in place
Disposal costs must be borne by the waste generators.	Not in place	
Establish an integrated and adequate network of disposal installations	Not in place	
Ensure safe combustion of used oil, where neither regeneration nor combustion is feasible, ensure safe destruction of controlled storage	In place	Need to be enforced
Cover all costs by the price to be charged by the operator for the disposal of used oil	Not in place	
Prevent or minimize quantities of used oil that are not disposed properly	Not in place	Quantify target for used oil well disposed
Ensure that the price of disposal is transparent	Not in place	

Source: Developer by Alma Leticia Figueroa Jimenez and Samuel Lopez, El Instituto de Ciencias Biomedicas, La Universidad Autónoma de Juárez.

Conclusions

Regulations are in place at the federal level in Mexico to ensure the proper handling of used oil. However, with the limited data available, it is hard to determine how effective these regulations have been and what may be the ultimate fate of much of the used oil in Mexico. As with state programs in the U.S., it is reasonable that used oil management in Mexico should both encourage increased collection of used oil to avoid its improper disposal as well as greater recycling and reuse of used oil. Better data collection could provide insight into the implementation of these regulations and allow for future policy changes in the interest of increase proper collection of used oil and encouraging used oil recycling. Furthermore, public education could bring an awareness to the problem of improper disposal of used oil and its environmental consequences.

Notes

[1] Comisión Nacional de Áreas Naturales Protegidas (CONAP), *Ley General del Equilibrio Ecológico y la Protección al Ambiente*, Chapter VI, Article 151.

[2] Diario Oficial, *Ley General para la Prevención y Gestión Integral de los Residuos* (October 8, 2003).

[3] Ibid.

[4] CONAP, *Ley General del Equilibrio Ecológico y la Protección al Ambiente*, Chapter VI, Article 151 (January 28, 1998).

[5] Ibid.

[6] Ibid.

[7] Ibid.

[8] Ibid.

[9] Ibid.

[10] SEMARNAT, *Gestión de Materiales, Residuos y Actividades de Riesgo*. Online. Available: http://portal.semarnat.gob.mx/semarnat/portal/!ut/p/kcxml/04_Sj9SPykssy0xPLMnMz0vM0Y_QjzKLN4j39QHJgFjGpvqRqCKOcAFfj_zcVP1QiLBngH6kqX6Emb63foB-QW5oRHmFiSMALvXBuw!!/delta/base64xml/L3dJdyEvd0ZNQUFzQUMvNElVRS82XzBfTU0! Accessed December 1, 2005.

[11] Ibid.

[12] The Law of Ecological Balance and Environmental Protection of the State of Chihuahua

[13] SEMARNAT, *Norma Oficial Mexicana NOM-002-SCT-2003*, December 3, 2003.

[14] Ibid.

[15] Estimates from October 2006 were approximately $2.31.[15]

[16] Ibid.

[17] SEMARNAT, *Norma Oficial Mexicana NOM-002-SCT-2003*, December 3, 2003.

[18] SEMARNAT, *Norma Oficial Mexicana NOM-056-SEMARNAT-1993. D.O.F,* July 2, 1993.

[19] Alma Leticia Figueroa Jimenez, Professor of Biology, Institute of Biomedical Sciences, University Autónoma at Juárez and Elva Denisse Varela-Olivas, Attorney, Baker and McKenzie, Used Oil Management Across the Mexico-U.S. Border: Burn, Dump, or Recycle? Conference at the University of Texas at Austin, March 1, 2007.

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Appendix B. State Summaries

State: California

Used Oil Program: Yes
Program Age: 16
Program Annual Budget: $20,000,000
Staff Members Employed in Program: 23

Available Collection Points:
- Curbside
- Municipal Collection Centers
- Service Outlets
- Retailers

Other: Temporary household hazardous waste collection events are available periodically in many parts of the state

Program Funding Sources:
- Non-Refundable Fees

Funds used to:
- Pay Administrative Costs of Program
- Establish Collection Programs
- Enhance Operational Programs
- Provide Public Education Programs
- Provide Private Sector Education Programs

Required to Register with State:
- Generators
- Transporters
- Collection Centers

Processors: Re-refiners

Regulate disposal of used oil filters: Yes
Filter can be thrown in landfill: No
Generators can dispose in landfills: No
Generators can burn: No

Have programs to encourage recycling: Yes
Observed increase in recycling since program's inception: Yes

Open-ended question response:
"Increase the advanced disposal fee (currently 4 cents per quart in California) to a higher fee that will more effectively pay for actual cost of collecting the used oil from DIYers

(for example, 10 cents per quart). Institute an advanced disposal fee for oil filters (for example, 25 cents per filter), administer the fee similar to the used oil program."

State: Illinois

Used Oil Program: Yes
Program Age: 13
Program Annual Budget: money not partitioned
Staff Members Employed in Program: staff do both RCRA and solid waste

Available Collection Points:
- Municipal Collection Centers
- Service Outlets
- Retailers
- Other: public hazardous waste collection events

Program Funding Sources:
- General Funds

Funds used to:
- Pay Administrative Costs of Program
- Establish Collection Programs
- Provide Private Sector Education Programs

Required to Register with State
- Collection Centers

Generators report: Annual Basis
Transporters report: Not Required to Report
Collection Centers report: only quantities manifested to site
Processors report: Annual Basis
Re-refiners report: Annual Basis

Regulate disposal of used oil filters: Yes
Filter can be thrown in landfill: No
Generators can dispose in landfills: No
Generators can burn: No

Have programs to encourage recycling: Yes
Observed increase in recycling since program's inception: Yes

Open-ended question response:
No response

State: Pennsylvania
Used Oil Program: Yes
Program Age: 21
Program Annual Budget: Not separate item in waste program budget
Staff Members Employed in Program: no staff dedicated full time to used oil program

Available Collection Points:
- Service Outlets
- Retailers
- Other: some household hazardous waste collection sites accept used oil

Program Funding Sources:
- General Funds

Funds used to:
- Pay Administrative Costs of Program
- Provide Public Education Programs

Required to Register with State
- Transporters
- Collection Centers
- Re-refiners

Generators report: all but motor oil generators report biennially
Transporters report: Not Required to Report
Collection Centers report: Not Required to Report
Processors report: depends upon permit requirements
Re-refiners report: N/A

Regulate disposal of used oil filters: Yes
Filter can be thrown in landfill: Yes
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: Yes
Observed increase in recycling since program's inception: Yes

Open-ended question response:
"Consider banning used oil filters from landfill disposal."

State: Washington

Used Oil Program: Yes
Program Age: over 20
Program Annual Budget: does not know
Staff Members Employed in Program: not provided but 117 in hazardous waste program

Available Collection Points:
- Service Outlets
- Retailers
- Other: moderate risk waste facilities

Program Funding Sources:
- General Funds
- Non-Refundable Fees

Funds used to:
- Pay Administrative Costs of Program
- Enhance Operational Programs
- Provide Public Education Programs
- Provide Private Sector Education Programs

Required to Register with State
- Transporters
- Collection Centers

Processors
- Re-refiners

Generators report: N/A
Transporters report: Other
Collection Centers report: Other
Processors report: Annual Basis
Re-refiners report: Annual Basis

Regulate disposal of used oil filters: Yes
Filter can be thrown in landfill: No
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: Yes
Observed increase in recycling since program's inception: Yes

Open-ended question response:
"More testing of the used oil at the point of generation"

State: Oregon

Used Oil Program: Yes
Program Age: 29
Program Annual Budget: minimal
Staff Members Employed in Program: minimal

Available Collection Points: Curbside; Service Outlets; Retailers; and Other.

Program Funding Sources: General Funds; Non-Refundable Fees; Refundable Deposits; and Other.

Funds used to: Pay Administrative Costs of Program; Establish Collection Programs; Enhance Operational Programs; Provide Public Education Programs; Provide Private Sector Education Programs; and Other.

Required to Register with State: Generators; Transporters; Collection Centers; Processors; and Re-refiners.

Generators report: Not Required to Report
Transporters report: Annual Basis
Collection Centers report: Annual Basis
Processors report: Annual Basis
Re-refiners report: Annual Basis

Regulate disposal of used oil filters: Response not provided
Filter can be thrown in landfill: Response not provided
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: Yes
Observed increase in recycling since program's inception: Yes

Open-ended question response:
"We have great curbside and other collection programs in Oregon for residential used oil, but a fair number of used oil generators don't realize that oil is included in these programs. We could use funding of an oil recycling educational program to get better utilization of the curbside programs. The curbside used oil collection programs are part of the curbside programs offered by franchised private garbage/recycling collection companies. Local governments set the rate that the garbage haulers can charge for service. That rate is high enough to cover not only the garbage cost, but also the cost of providing curbside recycling, recycling education, and other costs. The garbage haulers use these funds to provide the recycling as well as the garbage service. The money generally remains in the hands of the garbage/recycling collectors to pay their expenses, and little or none go to the local government or others to promote oil recycling"

State: Utah

Used Oil Program: Yes
Program Age: since 1993
Program Annual Budget: $600,000
Staff Members Employed in Program: 5

Available Collection Points:
- Municipal Collection Centers
- Service Outlets
- Retailers

Program Funding Sources:
- Non-Refundable Fees

Funds used to:
- Pay Administrative Costs of Program
- Establish Collection Programs
- Enhance Operational Programs
- Provide Public Education Programs
- Provide Private Sector Education Programs
- Other

Required to Register with State
- Transporters
- Collection Centers

Processors
- Re-refiners

Generators report: Not Required to Report
Transporters report: Annual Basis
Collection Centers report: Quarterly Basis
Processors report: Annual Basis
Re-refiners report: Annual Basis

Regulate disposal of used oil filters: No
Filter can be thrown in landfill: Yes
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: Yes
Observed increase in recycling since program's inception: Yes

Open-ended question response:
"1. Sign a bill which would ban used oil filters from landfills (require recycling). 2. Require all state agencies to purchase re-refined motor oil."

State: New Jersey

Used Oil Program: Yes
Program Age: 20
Program Annual Budget: $0-5000
Staff Members Employed in Program:0.1

Available Collection Points:
- Municipal Collection Centers
- Service Outlets
- Other: Household Hazardous Waste events

Program Funding Sources:
- Other

Funds used to:
- Pay Administrative Costs of Program
- Provide Public Education Programs

Required to Register with State
- Transporters
- Collection Centers

Processors
- Re-refiners

Generators report: Annual Basis
Transporters report: Annual Basis
Collection Centers report: Annual Basis
Processors report: Annual Basis
Re-refiners report: None at present

Regulate disposal of used oil filters: No
Filter can be thrown in landfill: Yes
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: Yes
Observed increase in recycling since program's inception: Yes

Open-ended question response:
"1. Fund and require county collection tanks. (At present, only 1 or 2 counties accept oil all year.) 2. Fund municipal collection tanks as in the past. 3. Ban filters from landfills. 4. Fund more education (printing costs, etc., that municipalities don't want to pick up). This is not as important as establishing drop-off sites."

State: South Dakota
Used Oil Program: Yes
Program Age: 20
Program Annual Budget: no monies are specific to administering the used oil portion; in total, the state's hazardous waste program budget is approximately $350,000.00
Staff Members Employed in Program: total FTEs= 8

Available Collection Points:
- Municipal Collection Centers
- Service Outlets
- Retailers

Program Funding Sources:
- General Funds

Funds used to:
- Pay Administrative Costs of Program

Required to Register with State
- Transporters

Processors
- Re-refiners

Generators report: Not Required to Report
Transporters report: Not Required to Report
Collection Centers report: Not Required to Report
Processors report: Biennially with reporting required on March 1, of each even numbered year for activities conducted the previous year
Re-refiners report: Biennially with reporting required on March 1, of each even numbered year for activities conducted the previous year

Regulate disposal of used oil filters: Yes
Filter can be thrown in landfill: No
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: Yes
Observed increase in recycling since program’s inception: Yes

Open-ended question response:
No response provided

State: New Mexico

Used Oil Program: Yes
Program Age: 3
Program Annual Budget: Not separated out of larger budget
Staff Members Employed in Program: Part of the job of 10 Hazardous Waste Inspectors

Available Collection Points:
- Municipal Collection Centers
- Service Outlets
- Retailers

Required to Register with State
- Transporters
- Collection Centers

Processors
- Re-refiners

Generators report: Not Required to Report
Transporters report: Not Required to Report
Collection Centers report: Not Required to Report
Processors report: Annual Basis
Re-refiners report: Annual Basis

Regulate disposal of used oil filters: Yes
Filter can be thrown in landfill: No
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: Yes
Observed increase in recycling since program's inception: No

Open-ended question response:
No response provided

State: Wisconsin

Used Oil Program: Yes
Program Age: 11
Program Annual Budget: Waste and Materials Management budget does not specifically identify
Staff Members Employed in Program: estimated at less than or equal to 1

Available Collection Points:
- Municipal Collection Centers
- Service Outlets
- Retailers

Program Funding Sources:
- General Funds

Funds used to:
- Pay Administrative Costs of Program
- Provide Public Education Programs
- Provide Private Sector Education Programs
- Other

Required to Register with State
- Transporters

Processors
- Re-refiners

Generators report: Not Required to Report
Transporters report: Not Required to Report
Collection Centers report: Not Required to Report
Processors report: Biennially
Re-refiners report: Biennially

Regulate disposal of used oil filters: Yes
Filter can be thrown in landfill: No
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: Yes
Observed increase in recycling since program's inception: Yes

Open-ended question response:
"Add fees or refundable deposits to the costs of virgin motor oil and oil filters to promote and fund used oil and used oil filter collection in Wisconsin. Make recycling of used oil filters and used oil absorbents mandatory, by banning landfill disposal and burning without energy recovery of these materials."

State: Arkansas

Used Oil Program: Yes
Program Age: 14
Program Annual Budget: No response provided
Staff Members Employed in Program: No response provided

Available Collection Points: Municipal Collection Centers ; Service Outlets; Retailers; and Other.

Program Funding Sources: Refundable Deposits

Funds used to: Pay Administrative Costs of Program; Enhance Operational Programs Provide Public Education Programs; and Other.

Required to Register with State: Generators; Transporters; and Collection Centers.

Processors: Re-refiners

Generators report: Not Required to Report
Transporters report: Not Required to Report
Collection Centers report: Not Required to Report
Processors report: Annual Basis
Re-refiners report: Annual Basis

Regulate disposal of used oil filters: Yes
Filter can be thrown in landfill: No
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: Yes
Observed increase in recycling since program's inception: Yes

Open-ended question response:
"I'm not sure how to answer. It depends on the scope of the program. I deal mainly with municipalities, so it would be a program for household do-it-yourselfers. In this case, I would suggest going through the 18 regional solid waste districts in the state. The biggest barriers would be economic. First there would need to be funding to set up collection centers, transportation, etc. Second, there would need to be markets/processors for the collected materials. The programs we currently have in place generally fall into one of two categories - either collected for use in an oil-burning heater for city/county facilities (most popular) or collected and disposed of through a household hazardous waste facility. Other barriers include that this is not seen as a priority program and a general feeling in the state that issues such as this should be handled by local governments instead of state mandates. I haven't really thought about how to overcome these barriers."

State: Idaho

Used Oil Program: No
Plan to Establish Program: No
Barriers to Establishing Program:
- Lack of Public Education
- Not Convenient
- Liability Concerns
- Lack of Available Funding

Available Collection Points:
Private Used Oil Collection Centers
Service Outlets
Retailers
- Other Collection Methods Available

Required to Register with State
- Transporters
- Collection Centers

Processors
- Re-refiners

Generators report: Not Required to Report
Transporters report: Not Required to Report
Collection Centers report: Not Required to Report
Processors report: Annual Basis
Re-refiners report: Annual Basis
Other Data Collected: Disposition of Used Oil

Regulate disposal of used oil filters: Yes
Filter can be thrown in landfill: No
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: Yes

Open-ended question response:
"Idaho is a large state, with little population scattered over vast areas. Most of the Idaho population is centered in Southeastern Idaho. This makes it easier to collect used oil in the more heavily populated areas, but difficult in lesser populated areas. Economically, it is not worth many private companies to conduct 'milk-runs' over large areas for small quantities of used oil. The main problem would be to develop some means of small communities to manage or use the used oil at their locations (i.e., burning for energy recovery) without transporting the used oil hundreds of miles."

State: Virginia

Used Oil Program: No
Plan to Establish Program: No
Barriers to Establishing Program:
Lack of Available Funding

Available Collection Points:
Private Used Oil Collection Centers
Service Outlets
Retailers
Other Collection Methods Available

Required to Register with State
Transporters
Processors
Re-refiners

Generators report: Not Required to Report
Transporters report: Not Required to Report
Collection Centers report: Not Required to Report
Processors report: Not Required to Report
Re-refiners report: Not Required to Report
Other Data Collected: used oil recycling is a voluntary program, reported on annually by localities as part of their recycling rate reporting

Regulate disposal of used oil filters: Yes
Filter can be thrown in landfill: No
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: Yes

Open-ended question response:
"network of collection sites, both public and private, to accept the oil from do it yourselfers necessary"

State: Texas

Used Oil Program: No
Plan to Establish Program: No
Barriers to Establishing Program:
None

Available Collection Points:
Private Used Oil Collection Centers
Service Outlets
Retailers

Required to Register with State
    Transporters
    Collection Centers
Processors
    Re-refiners

Generators report: Unanswered
Transporters report: Unanswered
Collection Centers report: Unanswered
Processors report: Unanswered
Re-refiners report: Unanswered

Regulate disposal of used oil filters: No
Filter can be thrown in landfill: No
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: Yes

Open-ended question response:
"Development of the Used Oil Program was a very successful tool to overcome the major barriers."

State: Nebraska

Used Oil Program: No
Plan to Establish Program: No
Barriers to Establishing Program:
None
NDEQ has partnered with Keep Nebraska Beautiful to set up a private program

Available Collection Points:
Private Used Oil Collection Centers
Service Outlets
Other Collection Methods Available

No Registration Required

Generators report: Not Required to Report
Transporters report: Not Required to Report
Collection Centers report: Not Required to Report
Processors report: Not Required to Report
Re-refiners report: Not Required to Report
Other Data Collected: None

Regulate disposal of used oil filters: Yes
Filter can be thrown in landfill: No
Generators can dispose in landfills: No
Generators can burn: Yes

Have programs to encourage recycling: No

Open-ended question response:
"A state administered program would not be required. The KNB program has set up a network of collection sites that keep used oil out of the environment. I would advise our limited resources be used where there are real problems."

Appendix C. State Survey

Used Oil Management Exit this survey >>

Please provide the following information.

1. Please provide the following information.

State

Agency/Department

Your Name

Your Title

Name of Used Oil Program Coordinator (if different from person filling out this survey)

Next >>

Used Oil Management Exit this survey >>

Please respond to the following statement by marking either 'Yes' or 'No'.

2. We have a state administered used oil program.

- Yes
- No

<< Prev **Next >>**

Used Oil Management

Please respond to the following questions.

3. Approximately how many years has your program existed?

4. What is the program's annual budget?

5. How many staff members does your program employ?

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Used Oil Collection

Please respond to the following statements by marking either 'Yes' or 'No'.

6. Curbside collection points are available in this state.

- Yes
- No

7. Municipal collection centers are available in this state.

- Yes
- No

8. Service outlets (e.g. collection at Jiffy Lube) collect used oil in this state.

- Yes
- No

9. Retailers (e.g. collection at Autozone, Kragen, etc.) collect used oil in this state.

- Yes
- No

10. Other collection methods are available in this state.

- No
- Yes (please specify)

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Program Funding

11. General funds are a source of funding for this program.

- Yes
- No

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Program Funding

12. Non-refundable fees added to the cost of virgin motor oil are a source of funding for this program.

- Yes
- No

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Program Funding

13. Refundable deposits added to the cost of virgin motor oil that are returned after the used oil has been collected are a source of funding for this program.

- Yes
- No

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Program Funding

14. Other methods are used to fund this program.

- Yes
- No

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Program Funding

15. Funds are used to pay administrative costs of running the program.

- Yes
- No

16. Funds are used to establish collection programs.

- Yes
- No

17. Funds are used to enhance operational programs.

- Yes
- No

18. Funds are used to provide public education programs.

- Yes
- No

19. Funds are used to provide private sector education programs.

- Yes
- No

<< Prev Next >>

Used Oil Management

Exit this survey >>

Program Funding

20. Funds are used in other ways.

- Yes
- No

<< Prev Next >>

Used Oil Management

Data Collection

Please respond to the following statements by marking either 'Yes' or 'No'.

21. Used oil generators are required to register with the state.

- Yes
- No

22. Used oil transporters are required to register with the state.

- Yes
- No

23. Collection centers are required to register with the state.

- Yes
- No

24. Used oil processors are required to register with the state.

- Yes
- No

25. Used oil re-refiners are required to register with the state.

- Yes
- No

<< Prev **Next >>**

Used Oil Management

Data Collection

26. Used oil generators are required to report volume of used oil generated:

- On a monthly basis
- On a quarterly basis
- On an annual basis
- Used oil generators are not required to report volume of used oil generated
- Other (please specify frequency of reporting)

27. Used oil transporters are required to report volume of used oil transported:

- On a monthly basis
- On a quarterly basis
- On an annual basis
- Used oil transporters are not required to report volume of used oil transported
- Other (please specify frequency of reporting)

28. Used oil collection centers are required to report volume of used oil collected:

- On a monthly basis
- On a quarterly basis
- On an annual basis
- Used oil collection centers are not required to report volume of used oil collected
- Other (please specify frequency of reporting)

29. Used oil processors are required to report volume of used oil processed:

- On a monthly basis
- On a quarterly basis
- On an annual basis
- Used oil processors are not required to report volume of used oil processed
- Other (please specify frequency of reporting)

30. Used oil re-refiners are required to report volume of used oil re-refined:

- On a monthly basis
- On a quarterly basis
- On an annual basis

Used Oil Management

Exit this survey >>

Data Collection

31. Other data collected (in addition to volume of used oil handled) includes:

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Used Oil Filters

Please respond to the following statements by marking either 'Yes' or 'No'.

32. Our state regulates the disposal of used oil filters

- Yes
- No

33. In our state any used oil filter can be thrown into a landfill.

- Yes
- No

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Used Oil Disposal and Recycling

34. In our state, used oil generators can dispose of used oil in landfills.

- Yes
- No

35. In our state, used oil generators can burn used oil.

- Yes
- No

36. Our state has programs to encourage used oil recycling.

- Yes
- No

37. We have observed an increase in used oil recycling since the inception of our program.

- Yes
- No

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Used Oil Management

Please respond to the following question.

38. If the governor of your state wanted to improve the state administered used oil program, what changes or improvements would you recommend to him or her?

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Establishing a Used Oil Management Program

Please mark all that apply.

39. We have plans to begin a used oil collection program in:

- [ ] 1-2 years
- [ ] 3-4 years
- [ ] 5 or more years
- [ ] We do not have plans to begin a used oil collection program.

40. Barriers to establishing a used oil program in our state include:

- [ ] Lack of public education
- [ ] Not convenient
- [ ] Liability concerns
- [ ] Lack of available funding
- [ ] Fear of contaminated oil
- [ ] Lack of possible collection points
- [ ] Other (please specify the additional barrers your state has encountered)

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Used Oil Collection

Please respond to the following statements by marking either 'Yes' or 'No'.

41. There are private used oil collection centers in our state.

- ( ) Yes
- ( ) No

42. Service outlets (e.g. collection at Jiffy Lube) collect used oil in this state.

- ( ) Yes
- ( ) No

43. Retailers (e.g. collection at Autozone, Kragen, etc.) collect used oil in this state.

- ( ) Yes
- ( ) No

44. Other collection methods are available in this state.

- ( ) Yes
- ( ) No

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Data Collection

Please respond to the following statements by marking either 'Yes' or 'No'.

45. Used oil generators are required to register with the state.

- Yes
- No

46. Used oil transporters are required to register with the state.

- Yes
- No

47. Collection centers are required to register with the state.

- Yes
- No

48. Used oil processors are required to register with the state.

- Yes
- No

49. Used oil re-refiners are required to register with the state.

- Yes
- No

<< Prev **Next >>**

Used Oil Management

Data Collection

50. Used oil generators are required to report volume of used oil generated:

- On a monthly basis
- On a quarterly basis
- On an annual basis
- Used oil generators are not required to report volume of used oil generated
- Other (please specify frequency of reporting)

51. Used oil transporters are required to report volume of used oil transported:

- On a monthly basis
- On a quarterly basis
- On an annual basis
- Used oil transporters are not required to report volume of used oil transported
- Other (please specify frequency of reporting)

52. Used oil collection centers are required to report volume of used oil collected:

- On a monthly basis
- On a quarterly basis
- On an annual basis
- Used oil collection centers are not required to report volume of used oil collected
- Other (please specify frequency of reporting)

53. Used oil processors are required to report volume of used oil processed:

- On a monthly basis
- On a quarterly basis
- On an annual basis
- Used oil processors are not required to report volume of used oil processed
- Other (please specify frequency of reporting)

54. Used oil re-refiners are required to report volume of used oil re-refined:

- On a monthly basis
- On a quarterly basis
- On an annual basis

Used Oil Management

Exit this survey >>

Data Collection

55. Other data collected (in addition to volume of used oil handled) includes:

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Used Oil Filters

Please respond to the following statements by marking either 'Yes' or 'No'.

56. Our state regulates the disposal of used oil filters

- Yes
- No

57. In our state any used oil filter can be thrown into a landfill.

- Yes
- No

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Used Oil Processing and Recycling

58. In our state, used oil generators can dispose of used oil in landfills.

- Yes
- No

59. In our state, used oil generators can burn used oil.

- Yes
- No

60. Our state has programs to encourage used oil recycling.

- Yes
- No

<< Prev **Next >>**

Used Oil Management

Exit this survey >>

Used Oil Management

Please respond to the questions below.

61. If the governor of your state approached you for advice on establishing a state administered used oil program, what advice would you give him or her? Specifically, what are the major barriers the program would have to overcome to be successful? How can they be overcome?

<< Prev **Next >>**

Appendix D. List of Used Oil Handlers in Ciudad Juárez

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
GCC Cemento S.A. de C.V. Planta Juarez	Km. 5 al Poniente del Aeropuerto Federal, Colonia Cementera, Codigo posta 3200	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V. (08-037-PS-I-02-03)	Controlled Confinement	1,200
GCC Cemento S.A. de C.V. Planta Samalayuca	Km. 332 Carretera 45, Codigo postal 32730	GCC Cemento S. A.de C. V. (8-37-PS-VI-02-2004)	Obtainment of Energy	6,400
Componentes de Iluminacion S. de R.L. de C.V.	Parque Industrial Juarez Gema, Calle Magneto, Codigo Postal 32648	Rinquim S.A. de C.V. (08-37B-PS-II-03-03)	Incineration (thermal oxidation)	N/A
ADC de Juárez S. de R.L. de C.V.	Calle Antonio J. Bermudez, Colonia Partido Doblado, C.P. 32310	COMPAÑIA RINCHEM S.A. DE C.V. (08037-PSII-0303)	Obtainment of Energy	0.9370
Ademco de Juarez S.A. de C.V.	Complejo Industrial Los Fuentes, Calle Av. Fuentes Sur, Colonia Los Fuentes, C.P.32320	EMS of Texas (TXR000020107)	Reutilization	N/A
Advance Transformer Co. S. A. de C. V. División Capacitores	Calle Costa de Marfil 7205, Colonia infonavit tecnologico, C.P.32697	Safety Kleen Corp. (915-778-8773)	Obtainment of Energy	134
Alcoa Fujikura de Mexico S.de R.L de C.V.	PARQUE INDUSTRIAL BERMUDEZ, CALLE FRESNEL SN, C.P.32470	Ashaland Distribution Company (TXD9807745095)	Reutilization	N/A
ALEJANDRO VALTIERRA MELENDEZ	Calle Panama, Colonia Hidalgo, C.P.3231o	RECICOLECTO SA DE CV (08 37 GM - I - 19-99)	Obtainment of Energy	600
APLICADORES MEXICANOS S.A. DE C.V.	Parque Industrial Juarez Gema, Calle Auxiliar 1, Codigo Postal 32630	MESA OIL (NMD000096024)	Reutilization	N/A
Arboles Navideños de Juaréz S.A. de C.V.	Parque Industrial Omega, Calle Manila 5981, C.P.32528	Compañia Rinquim S.A. de C.V. (08-037-PS-II-03-03)	Controlled Confinement	N/A

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
AUTOVIDRIO S.A. DE C.V.	PARQUE INDUSTRIAL RIO BRAVO, Calle MIGUEL CATALAN 420, C.P. 32700	GEN INDUSTRIAL S.A DE C.V. (19-26-B-PS-1-37-99)	Controlled Confinement	N/A
AVERY DE MEXICO S.A. DE C.V.	PARQUE INDUSTRIAL JUAREZ, Av.EJE VIAL JUAN GABRIEL 2420, Colonia JARDINES DE SAN JOSE, C.P. 32390	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V. (08-037-PS-I-02-03)	Controlled Confinement	2,865
AVIO EXCELENTE S. A. DE C. V.	Parque Industrial Omega, Calle Manila 5981, C.P.32528	Rinquim S.A. de C.V. (08-37B-PS-II-03-03)	Controlled Confinement	N/A
ALMACENES DISTRIBUIDORES DE LA FRONTERA S.A DE C.V.	Av. De las torres 120, Colonia Salvacar, C.P.32580	INDUSTRIA NACIONAL DE LUBRICANTES (14-120-PS-VI-04-2004)	Obtainment of Energy	200
ALMACENES DISTRIBUIDORES DE LA FRONTERA S.A. DE C.V.	Calle Henry Durant 5108 , Colonia Progresista , C.P. 32510	N/A	N/A	96
ANSELL EDMONT INDUSTRIAL INC. DE MEXICO S.A. DE C.V.	PARQUE INDUSTRIAL A J BERMUDEZ, AV. ANTONIO J. BERMUDEZ 1050, C.P. 32470	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V. (08-037-PS-I-02-03)	Obtainment of Raw Materials	N/A
ANSELL PERRY DE MEXICO S.A DE C.V PLANTA SALVARCAR	BLVD. INDEPENDENCIA 1450, Colonia PATRIA II, C.P.32551	RECICOLECTO SA DE CV.(8-37B-PS-II-14-99)	Controlled Confinement	220
ARK LES COMPONENTS S.A DE C.V.	Parque Industrial Antonio J Bermudez, Calle Fresnel a un costado de Cummins Recon 8750, C.P.32470	Lea Land Landfill New Mexico (EPA NA00002-CHJ)	Controlled Confinement	N/A
INDUSTRIAS BM DE MEXICO S.A. DE C.V.	EJE VIAL JUAN GABRIEL, Colonia REVOLUCION MEXICANA 5440 , C.P. 32650	ENERGETICOS BASICOS S.A. DE C.V (5-27-PS-V-03-94)	Rotary Furnaces	11,800

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
DULCES BLUEBERRY S.A. DE C.V	PARQUE INDUSTRIAL FERNANDEZ, Calle EL CID 7830 Y MAGNETO, Colonia PARQUE IND. FERNANDEZ, C.P.32460	MESA OIL (NMD000096024)	Reutilization	N/A
CADIMEX S.A. DE C.V.	PARQUE INDUSTRIAL SALVARCAR, Calle Henequen, Colonia SALVARCAR, C.P. 32690	EMILIANO ZAPATA TRANSPORTATION	Boilers	N/A
CAMPESTRE JUAREZ A.C.	Calle PARTIDO SENECU, Colonia CAMPESTRE, C.P. 3200	CAMPESTRE JUAREZ A.C.	Controlled Confinement, Evaporation, Thickening and Filtration of Oil Mud	17.2
BOBINAS DEL SUR S.A. DE C.V.	PARQUE INDUSTRIAL NORTH GATE, CALLE TAGUCHI Y AV. ISHIKAWA 9750, C.P. 32400	Rinquim S.A. de C.V. (08-37-PS-II-03-03)	Boilers	N/A
ELECTRONICA BRK DE MEXICO S.A. DE C.V.	Parque Industrial Juárez 3810, C.P.32630	RIMSA (08-037--PS-II-05-02)	Controlled Confinement	7,400
BRP MEXICO S.A. DE C.V.	Parque Industrial Antonio J Bermudez, Calle Isaac Newton 1650, C.P.32470	US ECOLOGY TEXAS	Controlled Confinement	68.768
CANAM DE JUAREZ S.A. DE C.V.	Fuera de parque industrial , Ave. Tecnológico antes Panamericana 9920, Colonia Puente Alto, C.P.32695	RESESA (08-037-PS-II-01-01)	Controlled Confinement	600
CARLOS BARRERA ESQUIVEL	Calle Delicias 2185 , Colonia Fifel Avila , C.P. 32540	INDUSTRIA NACIONAL DE LUBRICANTES(120-PS-VI-04-2004)	Reparation of Alternative Combustibles	200
CEQUENT TRAILER PRODUCTS S. A. DE C. V.	AV. ENRIQUE PINONCELLI 9578, Colonia PUENTE ALTO, C.P.32695	El Paso Iron & Metal CO. (TXD007398175)	Secondary Smelting	960

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
CHERRY DE MEXICO S.A. DE C.V	PARQUE INDUSTRIAL INTERMEX, AVENIDA. VALLE DE LOS CEDROS 1650, C.P.32690	INDUSTRIA NACIONA DE LUBRICANTES(14-120-PS-VI-04-2004)	Reparation of Alternative Combustibles	200
COCLISA S.A. DE C.V. PLANTA EL JARUDO	AV. CESAREO SANTOS DE LEON 6475, Colonia EL JARUDO CP. 32650	GEN INDUSTRIAL S.A DE C.V.(19-26B-PS-1-37-99)	Controlled Confinement	N/A
COCLISA S.A. DE C.V. COMPLEJO OMEGA	PARQUE INDUSTRIAL OMEGA, AV. LIENZO DEL CHARRO 1751, Colonia LA PLAYA, C.P. 32310	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V.	Rotary Furnaces (recycled)	N/A
COCLISA S.A DE C.V. PLANTA SAN LORENZO	COMPLEJO INDUSTRIAL LAS FUENTES, AV. DE LAS FUENTES 7325, Colonia PARTIDO DOBLADO, C.P. 32320	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V.	Rotary Furnaces (recycled)	N/A
COILCRAFT DE MEXICO S. DE R.L. DE C.V.	Camino viejo a San Lorenzo 6351, Colonia San Lorenzo, CP.32320	RIMSA S.A. DE C.V.	Cemented Furnaces	200
Columbus Industries Mexico S. de R.L. de C.V.	Parque industial Las Americas, Avenida Independencia 2159, CP. 32690	Environmental Management Services of Texas Inc	Obtainment of Energy	N/A
COMPAÑIA ARMADORA S. DE R.L .DE C.V.	Parque Industrial Rio Bravo, Av. Rio Bravo 1440, CP. 32550	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V.	Obtainment of Energy	N/A
COMPONENTES ELECTRICOS DE LAMPARAS S.A DE C.V	PARQUE INDUSTRIAL JUAREZ, AV. PARQUE INDUSTRIAL JUAREZ 3951 C.P. 32630	RECICOLECTO SA DE CV	Reutilization	20,739
CONFECCIONES DE JUAREZ S.A. DE C.V.	Parque industrial NORTH GATE, CALLE TAGUCHI Y AV. ISHIKAWA 9040, C.P. 32400	Residuos Industriales Multiquim S.A. de C.V.	Obtainment of Energy	1,280

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
CONDUCTORES TECNOLOGICOS DE JUAREZ SA DE CV PLANTA 1	PARQUE INDUSTRIAL AZTECAS, AV. PARQUE INDUSTRIAL AZTECAS 620, C.P. 32679	CIA RINQUIM SA	N/A	N/A
CONDUCTORES TECNOLOGICOS DE JUAREZ SA DE CV PLANTA 4	Parque Ind Aztecas, Boulevard Zaragoza 10130, C.P.32580	Compañia Rinquim SA de CV	Controlled Confinement	N/A
CONDUCTORES TECNOLOGICOS DE JUAREZ SA DE CV PLANTA 5	Parque Ind Salvarcar, Av. Jose Mateos Torres 7154, Colonia Salvacar, C.P. 32580	Compañia Rinquim SA de CV	Controlled Confinement	N/A
CONTROLES DE TEMPERATURA S.A. DE C.V.	INFONAVIT CASAS GRANDES, AV. PROFR. RAMON RIVERA LARA 6415, INF. CASAS GRANDES, C.P. 32640	JESUS ERNESTO GRIJALVA LIMAS o RESESA (08-037-PS-II-01-01)	Obtainment of Raw Materials	800
CONTROLES ELECTROMECANICOS DE MEXICO S.A. DE C.V.	BOULEVARD ZARAGOZA 1330 Colonia SALVARCAR, C.P. 32573	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V.	Obtainment of Energy	124
Bussmann S. de R.L. de C.V.	Parque Industrial Omega, Calle Prolongación Hermanos Escobar 7750, Colonia Partido Manuel Doblado, C.P.32310	Compañía Rinquim S.A. de C.V.	Controlled Confinement	73,000
CORR MEX CIUDAD JUAREZ S.A. DE C.V.	PARQUE INDUSTRIAL AEROPUERTO, CARRETERA PANAMERICANA KM 18.5 9031 B, Colonia PQUE. IND. AEROPUERTO, C.P. 32685	RESESA Y-O FRANCISCO JAVIER GRIJALVA LIMAS (08-019-PS-I-08-00)	Controlled Confinement and Obtainment of Energy	600

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
Critikon de México S. de R.L. de C.V.	Parque Industrial Salvarcar, Calle Henequen 450, Colonia SALVARCAR, C.P. 32690	Thermo Fluids Inc (TXR 000043679)	Controlled Confinement	171
DEGREMONT S. A. DE C. V. Planta Norte	Parque Industrial SATELITE, Calle PASCUAL ORTIZ RUBIO 1155, Colonia Satelite , C.P. 32700	ENERGETICOS BASICOS S.A. DE C.V. (19-18-PS-VI-08-2004)	Obtainment of Energy	600
DELMEX DE JUAREZ S. DE R.L. DE C.V.	PARQUE INDUSTRIAL BERMUDEZ,AV, DE LAS INDUSTRIAS 1335, C.P. 32470	CHEMICAL RECLAMATION SERVICE (CHJR01339 2004)	Controlled Confinement	N/A
DELMEX DE JUAREZ S. DE R.L. DE C.V. PLANTA II	PARQUE INDUSTRIAL INTERMEX, AVENIDA INTERMEX 1681, C.P. 32040	Chemical Reclamation Services	Obtainment of Energy and Furnaces	N/A
Delphi Automotive Systems, S.A. de C.V.	Ave. Hermanos Escobar 5756, Colonia FOVISSSTE Chamizal, C.P.32310	Chemical Reclamation Services	Obtainment of Energy	N/A
Rio Bravo Eléctricos, S.A. de C.V. Planta XXII	Parque Industrial Rio Bravo, Ave. Rio Bravo , C.P.32550	Pro Ambiente S.A. de C.V. (5-35-PS-V-02-94)	Obtainment of Energy	N/A
DIESEL RECON DE MEXICO S.A DE C.V	PARQUE INDUSTRIAL ANTONIO J BERMUDEZ, AV. DE LAS INDUSTRIAS 751, C.P. 32280	CLEAN HARBORS LA PORTE LP	Incineration (thermal oxidation)	N/A
DYNAMIC PLASTICS MEXICANA S.A DE C.V	PARQUE INDUSTRIAL PANAMERICANO, Calle LOUIS BLERIOT 9751, C.P. 32695	PETRO REFINO (14 101 PS VI 08 99)	Preparation of Combustible Alternative	13,200

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
EAGLE OTTAWA S.A. DE C.V. PLANTA BERMUDEZ	Parque industrial ANTONIO J BERMUDEZ, BOULEVARD ANTONIO J. BERMUDEZ 1411, C.P.32470	INDUSTRIA NACIONAL DE LUBRICANTES (14-120-PS-VI-04-2004)	Preparation of Alternative Combustibles	N/A
Eagle Ottawa S.A. de C.V. Planta Jarudo	Fraccionamiento El Jarudo, Avenida Cesareo santos 6551, Colonia El Jarudo, C.P. 32650	INDUSTRIA NACIONAL DE LUBRICANTES (14-120-PS-VI-04-2004)	Preparation of Alternative Combustibles	N/A
EATON MOLDED PRODUCTS S. DE R.L. DE C.V.	PARQUE INDUSTRIAL FERNANDEZ, Calle OLIVER CROMWELL 2650, Colonia AZTECAS, C.P. 32649	ROMIC ENVIRONMENTAL SERVICES (AZD009015389)	Reutilization	N/A
ECO Transportes Internacionales S.A. de C.V.	Av. Manuel J. Clouthier 1018, Colonia Paseos de Zaragoza, CP.32550	Industria Nacional de Lubricantes S.A. DE C.V.	Rotary Furnaces (recycled)	N/A
Ensamble de Interiores Automotrices S. de R.L. de C.V. Planta II	Parque Industrial Gema II, Cerrada Industrial 5540, C.P. 32638	Residuos Industriales MULTIQUIM S.A. de C.V.	Controlled Confinement	2,200
ENSAMBLE DE INTERIORES AUTOMOTRICES, S. DE R.L. DE C.V	Calle PUERTO DE PALOS 1080 ,Colonia Patria ,C.P.32580	N/A	Chlorination and *maceramiento*	1,200
EDUMEX S.A. DE C.V.	PARQUE INDUSTRIAL RAMON RIVERA LARA, AV. RAMON RIVERA LARA 6620, C.P. 32605	3M Cottage Grove Incinerator	Obtainment of Energy	N/A
EES S.A. DE C.V. PLANTA 2	BLVD. INDEPENDENCIA 1151, LOTE BRAVO C.P. 32574	RINQUIM COMPANY	Reutilization	N/A

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
EES S.A. DE C.V.	Area Industrial en Ciudad Juarez, Av. de las Torres # 7125, Salvarcar C.P.32580	RINQUIM COMPANY S.A DE C.V.	Reutilization	N/A
Electro Componentes de México S.A. de C.V. Planta 1	Parque Industrial Juárez, Calle Chimeneas 5035, C.P. 32630	CIA. RINQUIM S.A. DE C.V.	Obtainment of Raw Materials	N/A
ELECTRO COMPONENTES DE MEXICO S.A. DE C.V. PLANTA 2	PARQUE INDUSTRIAL JUAREZ, calle CHIMENEAS 5035, C.P. 630	CIA. RINQUIM S.A. DE C.V.	Obtainment of Raw Materials	N/A
ELECTROLUX DE MEXICO S.A. DE C.V.	Parque Industrial Bermudez, Ave. de la Industria 951, C.P. 32470	RESIDUOS INDUSTRIES MULTIQUIM S.A. DE C.V.	Controlled Confinement	4,275
Electronica Dale de Mexico S.A de C.V. Planta BI	Parque Industrial Bermudez, Av. de las industrias 8750 CP. 32500	Recycled	Reutilization and Obtainment of Energy	N/A
Electronica Dale de Mexico S.A de C.V. Planta Bravos	Avenida de las Torres 1950 , Colonia Torres del Sur, C.P. 32500	Recycled	Controlled Confinement	1,300
ELECTRO TEC S.A.	AVENIDA HENRY DUNANT No. 5155, Colonia Progresista. C.P.32310	ENERGESICOS BASICOS S.A DE S.A. (19-18-PS-VI-08-2004)	Reutilization	3,200
Electrotécnica del Norte S. A. de C . V.	Complejo Industrial Zaragoza, Calle Neptuno 1917, Colonia Satelite, C.P. 32540	Rinquim Company SA de CV	Controlled Confinement	N/A
EL NORTE S.A.	Calle NIÑOS HEROES 1672 , Colonia , EL BARREAL , C.P.32040	INDUSTRIA NACIONAL DE LUBRICANTE	Preparation of a combustible alternative	300
EMPACADORA Y FRIGORIFICO RODEO S.A.DE C.V.	Calle Beta 2898, Colonia Industrial, CP. 32060	RESESA	Obtainment of Energy	1,200

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
EMPAQUES PACTIV S.A. DE C.V	PARQUE INDUSTRIAL CHIUAHUA, Calle NICOLAS GOGOL 11342, C.P. 31109	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V.	Controlled Confinement	50
ENSAMBLE DE INTERIORES AUTOMOTRICES S. DE R.L. DE C.V.	PARQUE INDUSTRIAL ZONA SUR, INDEPENDENCIA 8351, C.P. 32695	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V	Controlled Confinement	2,062
EPI DE MEXICO S. DE R. L. DE C. V.	Parque industrial RIO BRAVO, Av. Rio Bravo 1080, CP. 32550	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V	Destabilization or Solidification	200
EPSON DE JUAREZ S.A. DE C.V. PLANTA 1	Parque Industrial Rio Bravo, Calle Enrico Fermi 1451, C.P. 32550	Heat Treatment services (TXD980624035)	Obtainment of Energy	N/A
EPSON DE JUAREZ S.A. DE C.V. PLANTA 2	Parque Industrial Rio Bravo, Calle Enrico Fermi 1351, C.P. 32550	RIMSA	Incineration (thermal oxidation)	N/A
EURO VEHICULOS S.A. DE C.V.	BLVD. GOMEZ MORIN 8810, Colonia partido romero, C.P. 32470	RECICOLECTO S.A. DE C.V.	Obtainment of Energy	7,200
EXPORTACIONES DIAZ S.A	PUERTO INDUSTRIAL, FCO. GONZALEZ BOCANEGRA 1650 FCO. GONZALEZ BOCANEGRA, C.P.32599	RECICOLECTO S.A. DE C.V.	Controlled Confinement	500
EXPORTACIONES DIAZ S.A PLANTA II	Calle JOSE BORUNDA 1835 , Colonia PARTIDO ROMERO, C.P. 32030	IND. NACIONAL DE LUBRICANTES	Confinamiento controlado y Fundicion secundaria	50
FALCON DE JUAREZ S.A. DE C.V.	PARQUE INDUSTRIAL GEMA 2, EJE VIAL JUAN GABRIEL Y CERRADA INDUSTRIAL 5681. Colonia la Cuesta C.P. 32650	N/A	N/A	150

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
FCI Electronics Mexico S. de R.L de C.V.	Parque Industrial Intermex, Calle Intermex Av. de las Torres 1551, C.P. 323574	RIMSA	Obtainment of Energy	N/A
Ferraz Shawmut México S A De C V	Parque Industrial Rio Bravo, Av. Rio Bravo 1251, C.P.32557	RIMSA	Obtainment of Energy	N/A
FLETES SOTELO S.A. DE C.V.	Calle CAMINO DE LOS ESTEROS 720, Colonia San Lorenzo, C.P. 32410	ENERGETICOS BASICOS	Reutilization	N/A
FOSTER ELECTRIC MEXICO S.A. DE C.V.	PARQUE INDUSTRIAL OMEGA, HENRY DUNANT 6340, C.P. 419	PETRO REFINO SA DE CV (14-101-PS-VI-08-99)	Reutilization	484
GEXIQ S. A. DE C. V.	EJE VIAL JUAN GABRIEL 9970, Colonia Puente Alto, C.P. 32690	Energéticos Básicos S.A. de C.V.	Obtainment of Energy	200
Gladstone S.A. de C.V.	Avenida Vicente Guerrero 206 , Colonia Centro, C.P. 32881	Volumen annual de descargas al agua	Annual Volume of Unloading of Water	202
HARPER MEX S.A. DE C.V.	PARQUE INDUSTRIAL RIO BRAVO, MANUEL SANDOVAL VALLARTA 340, C.P, 32920	Rinquim Company	Incineration (thermal oxidation)	2,400
INSTITUTO MEXICANO DEL SEGURO SOCIAL HOSPITAL GENERAL DE ZONA No 6	Calle JUVENAL ARAGON ROMO 450 , Colonia Pronaf, C.P. 32310	N/A	N/A	60,459
HONEYWELL OPTOELECTRONICA S. DE R. L. DE C.V. PLANTA 1	Parque Industrial INTERMEX JUAREZ, Calle PARQUE INDUSTRIAL JUAREZ 3328, C.P.32630	N/A	N/A	200

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
HOPKINS MANUFACTURING DE MEXICO S. DE R.L. DE C.V.	Parque Industrial Fernández, Calle Oliver Cromwell 2810, C.P. 32649	Chemical Reclamation Services (TXDO 46844700)	Controlled Confinement	N/A
I.G. MEX. S. DE R.L. DE C.V. PLANTA 1	PARQUE INDUSTRIAL BEFER, Calle FRAY PEDRO DE GANTE 6920, C.P. 32320	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V.	Combustible Alternative	200
IG MEX S DE R.L. DE C.V. PLANTA 2	PARQUE INDUSTRIAL BEFER, Calle FRAY PEDRO DE GANTE 6920, C.P. 32320	Residuos Industriales Multiquim S.A. de C.V.	Obtainment of Energy	2,600
I.G. MEX. S. DE R.L. DE C.V. PLANTA 3	PARQUE INDUSTRIAL BEFER, AV. DE LOS FUENTES 321, C.P. 32320	Residuos Industriales Multiquim S.A. de C.V.	Controlled Confinement	3,836
IG MEX S. de R.L. de C.V. Planta 4	Parque Industrial Omega, Calles Entre Epsilon y Omega 1651, C.P. 32419	RIMSA	Controlled Confinement	800
I G MEX S DE R.L. DE C.V. PLANTA 5	PARQUE INDUSTRIAL BEFER, Calle FRAY PEDRO DE GANTE 6920, C.P. 32320	Residuos Industriales Multiquim S.A. de C.V.	Controlled Confinement	59,600
IG MEX S DE R.L. DE C.V. PLANTA 6	PARQUE INDUSTRIAL BERMUDEZ, BLVD. TOMAS FERNANDEZ 3751, C.P. 32470	Residuos Industriales Multiquim S.A. de C.V.	Controlled Confinement and Obtainment of Energy	100
IK PRECISION DE MEXICO SA DE CV	Parque Industrial Rio Bravo, Calle Enrico Fermi 1451, C.P. 32557	RIMSA	Controlled Confinement	600
IK PRECISION DE MEXICO SA DE CV IKPMI	Parque Industrial Rio Bravo, Calle Enrico Fermi 1351, C.P. 32557	RIMSA	Controlled Confinement	N/A

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
INDUSTRIAL DE MOLDEO DE MEXICO S. DE R.L. DE C.V.	PARQUE INDUSTRIAL JUAREZ,AV. PARQUE INDUSTRIAL JUAREZ 2925, C.P.32640	MESA OIL	Boiling	1,200
INDUSTRIAL INTERNATIONAL SERVICES S.A. DE C.V.	AV. TECNOLOGICO 2421 Colonia PARTIDO IGLESIAS C.P. 32517	RESESA	Controlled Confinement	3,456
INGENIERIA METALICA Y PLASTICA DE MEXICO S. DE R.L. MI	PARQUE INDUSTRIAL JUAREZ, AV. PARQUE INDUSTRIAL JUAREZ 4151 C.P.32360	ENERGETICOS BASICOS	Rotary Furnaces	3,600
INTERMATIC JUAREZ S. DE R.L. DE C.V. PLANTA PRAXEDIS	kM 62 CARRETERA JUAREZ PORVENIR C.P. 32870	RECICOLECTO S.A. DE C.V.	Furnaces Heating	20
Ingeniería y Troqueles Especializados S.A. de C.V.	Parque industrial Panamericano, Calle Santos Dumont 6730,C.P.32690	Rinquim Company S.A. de C.V.	Controlled Confinement	N/A
JUVER INDUSTRIAL S.A. DE C.V.	Parque Industrial OMEGA, Prol. Hermanos Escobar, Colonia P.I. OMEGA 6640 C.P.32320	ENSCO	Reutilization	N/A
KANE MAGNETICS DE MEXICO S.A. DE C.V.	PARQUE INDUSTRIAL SALVARCAR, C. BUFALO 451.B PARQUE INDUSTRIAL SALVARCAR C.P. 32703	N/A	N/A	N/A
KENSA DE MEXICO S. DE R.L. DE C.V.	PARQUE INDUSTRIAL GEMA Calle CHAMIZAL Y MAGNETO 7825, PARQUE IND. GEMA C.P. 32648	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V.	Controlled Confinement	700

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
KEY TRONIC JUAREZ S.A. DE C.V.	PARQUE INDUSTRIAL GEMA Calle MAGNETO 7824 C.P. 32680	Pro-Ambiente	Reutilization	27,000
LEAR MEXICAN TRIM OPERATIONS S. DE R.L. DE C.V.	Fuera de Parques Av. Ejercito Nacional 6525 Colonia El Marquez C.P. 32530	Rinquim Company S.A de C.V.	Controlled Confinement	N/A
Lear Electrical Systems de México S. de R.L. de C.V. Planta Monarca	Parque Industrial Omega Calle Sigma 6325, Colonia Parque Industrial Omega C.P. 32320	Rinquim Company S.A. de C.V.	Movement	N/A
Lear Mexican Trim Operations S. de R.L. de C.V. Planta Río Bravo	Parque Industrial Río Bravo Avenida 1181Río BravoParque Ind. Rio Bravo32550	Rinquim Company S.A. de C.V.	Controlled Confinement	N/A
Lear Electrical Systems de México S. de R.L. de C.V. Planta Reforma	Reforma 1104El Barreal 32540	Rinquim Company S.A. de C.V.	Reutilization	N/A
Lear Mexican Trim Operations S.R. de C.V. Planta San Lorenzo	BeeferAv. San Lorenzo25032320	Rinquim Company S.A. de C.V.	Controlled Confinement	N/A
Lear Electrical Systems de México S. de R.L. de C.V. Planta Triunfo	Parque Industrial Calle OmegaSigma 6320 Parque Industrial Omega C.P.32320	Rinquim Company S.A. de C.V.	Movement	N/A
LEAR MEXICAN TRIM OPERATION PLANTA VICTORIA	PASEO DE LA VICTORIA 9750 Fracc. CIELO VISTA C.P.32690	Rinquim Company S.A. de C.V.	Controlled Confinement	N/A
Lexmark Internacional S.A. de C.V. Planta CA1	Parque Industrial ,Salvarcar Fracc. Santiago, Troncoso 808 C.P. 32690	Compañía Rinquim S.A. de C.V.	Reutilization	N/A
LEXMARK INTERNACIONAL MEXICANA S. DE R.L. DE C.V.	Parque IndustrialSLAVARCAR, Blvd. Independencia1951, C.P. 32690	ENVIRONMENTAL MANAGEMENT SERVICE OF TEXAS	Controlled Confinement	11,200

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
Manufacturas Avanzadas S.A. de C.V.	Parque Industrial Salvarcar ,Boulevard Independencia 2151 Parque Industrial Salvarcar,C.P.32590	PSC Recovery Systems	Controlled Confinement	N/A
Manufacturas Metálicas y Laminadas S.A. de C.V.	Jarudo del NorteEje Vial Juan Gabriel4470Jarudo del Norte32659	Industria nacional de Lubricantes	Preparation of Combustibles	416
Manufacturas y Servicios Internacionales S. de R.L. de C.V.	Paqrque Industrial Omega, Calle Omega esquina con Av. Hnos. Escobar13532, C.P.3201	RECICOLECTO S.A. de C.V.	Preparation de Combustibles	70
Motores Electricos de Juarez S. de R.L. de C.V. Planta FCDM	Blvd. Zaragoza 6950, Fracc. Oasis, C.P.32690	Residuos Industriales Multiquim	Controlled Confinement	136,200
Motores Electricos de Juarez S. de R.L. de C.V. Planta FCM	PARQUE INDUSTRIAL JUAREZ SECCION GEMA Calle DEPORTISTAS 7825, PARQUE IND. GEMA, C.P. 32630	Residuos Industriales Multiquim	Controlled Confinement	37,000
MOTORES ELECTRICOS DE JUAREZ S. DE R.L. DE C.V. PLANTA FME	N/A	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V.	Controlled Confinement	400
MOTORES ELECTRICOS DE JUAREZ S. DE R.L. DE C.V. PLANTA MEJ 1	PARQUE INDUSTRIAL JUAREZ 3325 PARQUE IND. JUAREZ C.P.32630	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V.	Obtainment of Energy	2,600
MOTORES ELECTRICOS DE JUAREZ S. DE R.L. DE C.V. PLANTA MEJ 2	PARQUE INDUSTTRIAL JUAREZ 3325 PARQUE IND. JUAREZ C.P. 32360	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V.	Encapsulation	3,800
MICROCAST TECHNOLOGIES MEXICANA S. DE R.L. DE C.V	Parque Industrial Bermúdez 8220, C.P.32470	Químic Rimsa S.A de C.V.	Rotary Furnaces	39,100

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
Minera Bismark S.A de C.V	Av. ArboledasBismark C.P.31821	Energeticos Basicos SA de CV	Obtainment of Energy	60,000
MMJ S.A. DE C.V. PLANTA BERMUDEZ	PARQUE INDUSTRIAL ANTONIO J BERMUDEZ731ANTONIO J BERMUDEZ32470	RINQUIM COMPANY S.A. DE C.V.	Incineration (thermal oxidation)	N/A
MMJ S.A. de C.V. Planta 2	Parque Industrial Salvarcar 1181 Fracc.Desarrollo Salvarcar C.P.32590	MESA OIL INC.	Rotary Furnaces	N/A
MOLNLYCKE HEALTH CARE S.A. DE C.V. PLANTA 2	PARQUE INDUSTRIAL RIO BRAVO 420 PARQUE INDUSTRIAL C.P.32557	MESA OIL INC.	Rotary Furnaces	N/A
Monarch Litho de México S.A. de C.V.	PARQUE INDUSTRIAL OMEGA 6451 C.P.32320	Camino Real Landfill	Controlled Confinement	N/A
Morse Automotive Corporation México S de R. L de C.V.	Parque Industrial Fernández, 2035 Parque Industrial Fernández C.P.32649	Industria Nacional de Lubricantes	Rotary Furnaces	1,400
NEWELL WINDOW FURNISHING DE MEXICO S. DE R. L. DE C.V.	AV RAMON RIVERA LARA 6132 Fracc. PARTIDO ROMERO C.P.32500	RECICOLECTO S.A. DE C.V.	Obtainment of Raw Materials	170
NORTH AMERICAN PRODUCTION SHARING DE MEXICO SA DE C.V	P IND LOS AZTECAS 7950 C.P.32670	RESIDUOS INDUSTRIALES MULTIQUIM SA DE C.V RIMSA	Controlled Confinement	N/A
NOVAMEX MEXICO S.A. DE C.V.	AVE. DEL CHARRO 235 Fracc. ALAMOS DE SAN LORENZO, C.P. 32340	RESESA Y-O FRANCISCO JAVIER GRIJALVA LIMAS	Controlled Confinement	2,107
OPTRON DE MEXICO S.A. DE C.V.	PARQUE INDUSTRIAL RIO BRAVO1551PARQUE INDUSTRIAL RIO BRAVO32700	RESESA S.A. DE C.V.	Evaporation	N/A

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
OUTOKUMPU HEATCRAFT DE MEXICO S. DE R. L. DE C. V.	PARQUE INDUSTRIAL AEROJUAREZ 8775 C.P.32695	Residuos Industriales Multiquim	Obtainment of Energy	N/A
Potter & Brumfield de México S.A de C.V.	Avenida Antonio J. Bermúdez 1950 Parque Industrial Bermúdez C.P.32470	Gen Industrial SA de C.V.	Incineration (thermal oxidation)	3,400
Productos Electricos Diversificados S.A. de C.V. Planta 1	Parque Industrial Juarez 4310 Parque Industrial Juarez C.P.32630	Residuos Industriales Multiquim S.A. de C.V.	Stabilization or Solidification	N/A
Productos Electricos Diversificados S.A. de C.V. Planta 2	Zona Industrial Colonia Infonavit Los Parques 6214 C.P.32600	Proambiente S.A. de C.V. Planta Blender Norte	Cements	N/A
Productos Electricos Diversificados S.A. de C.V. Planta 3	Fraccionamiento Parques Industriales 6515 Fraccionamiento Parques Industriales C.P.32600	Proambiente S.A. de C.V. Planta Blender Norte	Cements	N/A
Pemex refinacion Terminal de Almacenamiento y Distribucion Cd. Juarez	PARQUE INDUSTRIAL KM.22.5 GRANJAS DE SANTA ELENA C.P.32690	RECICOLECTO S.A. DE C.V.	N/A	N/A
PRODUCTOS ESPECIALIZADOS Y MANUFACTURAS JUAREZ S. A. DE C. V. DIVISION FUNDICION	AV. TECNOLOGICO 7260 INFONAVIT TECNOLOGICO C.P.32699	ECOLTEC S. A. DE C. V.	Rotary Furnaces	400
PRODUCTOS DE CONSUMO ELECTRONICO PHILIPS S.A. DE C.V. PLANTA 10	BLVD. OSCAR FLORES 9590 C.P.32690	N/A	N/A	N/A
PLASTICO GIGANTE DE MEXICO S. A. DE C.V.	PARQUE INDUSTRIAL AZTECAS 32679 REVOLUCION MEXICANA C.P.32679	RESESA Y-O FRANCISCO JAVIER GRIJALVA LIMAS	Controlled Confinement	N/A

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
PRODUCTOS POWERS DE MEXICO S.A DE C.V	PARQUE INDUSTRIAL LOS AZTECAS1916PAR QUE INDUSTRIAL LOS AZTECAS32670	RESIDUOS INDUSTRIALES MULTIQUIM SA DE CV	Encapsulation	N/A
Praxair México S. de R. L. de C. V.	Zona Industrial Nombre de DiosNombre de Dios C.P.31110	Servicios Ambientales del Norte SA de CV	Controlled Confinement	500
PRODUCTOS DE CONTROL, S. DE R.L. DE C.V.	Parque Industrial Omega Calle Prolongación Hermanos Escobar 7151-B Parque Industrial Omega C.P.32320	CHEMICAL RECLAMATION SERVICES	Obtainment of Energy	N/A
PRODUCTOS DE AGUA S. DE R.L. DE C.V.	Calle COSTA DE MARFIL 6915 FRACC.OASIS C.P.32697	Thermo Fluids Inc.	Controlled Confinement	N/A
PRODUCTOS DE BARRO INDUSTRIALIZAD O S. A.	Calle CANUTILLO 310 Fracc. LADRILLERA C.P.32100	ECOLTEC S. A. DE C. V.	Rotary Furnaces	1,400
PRODUCTOS MARINE DE MEXICO S.A. DE C.V.	P. IND. ANTONIO J. BERMUDEZ CALLE OHM 8451 C.P.32470	RECICOLECTO S.A. DE C.V.	Obtainment of Energy	47,800
PRODUCTOS SECUNDARIOS RECICLABLES S.A. DE C.V.	EJE VIAL JUAN GABRIEL 3550 FRACC. 5 DE MAYO C.P.32620	RECICOLECTO	N/A	700
Rapid Industries de Mexico S.A de C. V.	Fuera de Parques CAlleVicente Guerreo 7845 Fracc.Los Parques C.P.32470	Texas Ecologist Inc.	Controlled Confinement	N/A
Raychem Juárez S.A de C.V	Parque Industrial Salvarcar Calle Santiago Troncoso 331 Lote Bravo C.P.32599	Rinquim Company S.A. de C.V.	Reutilization	N/A
Alambrados y Circuitos Eléctricos, S.A. de C.V. Planta II	Parque Industrial Paquime 5101 Parque Industrial Paquime C.P.31700	Pro Ambiente S.A. de C.V.	Obtainment of Energy	N/A

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
Rio Bravo Eléctricos, S.A. de C.V. Planta IV	Parque Industrial Omega 525 Parque Industrial Omega C.P.32320	Pro Ambiente S.A. de C.V.	Obtainment of Energy	N/A
Rio Bravo Electricos S.A de C.V. Planta V	Antonio J Bermudez CAlle Fresnel 8525 P. Ind. A. J. Bermudez C.P.32470	Pro Ambiente S.A. de C.V.	Reutilization	N/A
Rio Bravo Eléctricos, S.A. de C.V. Planta VII	Parque Industrial Río Bravo Ave. Rio Bravo 1420 Parque Industrial Río Bravo C.P.32550	Pro Ambiente S.A. de C.V.	Obtainment of Energy	N/A
Río Bravo Eléctricos S.A. de C. V. Planta IX	Parque Industrial Río Bravo1 420 Parque Industrial Río Bravo C.P.32550	Pro Ambiente S.A. de C.V.	Reutilization	N/A
Rio Bravo Electricos, S.A. de C.V. Planta XX	Juan N. Keppler 6915 Virreyes C.P.32500	Pro Ambiente S.A. de C.V.	Incineration (thermal oxidation)	N/A
RCA COMPONENTES S.A. DE C.V.	PARQUE INDUSTRIAL BERMUDEZ 2250 AVE. ANTONIO J. BERMUDEZ, C.P. 32649	M&M CHEMICAL COMPANY INC	Obtainment of Raw Materials	N/A
* RECICOLECTO S.A. DE C.V.	POLIGONO DE ALTO RIESGO LOTE 5 Y 18 FRACC VALLE DORADO, C.P.32690	INDUSTRIA NACIONAL DE LUBRICANTES	Preparation of Combustible Alternative	151,772
REFRESCOS S.K.Y. S.A.	Calle BEGONIAS 920, Colonia BELLAVISTA, C.P.32130	RECICOLECTO SA DE CV	Obtainment of Energy	200
REFRIGERADORA CARTA BLANCA DE CD. JUAREZ S.A.	Calle RAMON CORONA 475, Colonia ZONA CENTRO, C.P.32000	DIATOR OF MEXICO	Obtainment of Energy	1,800
RESIDUOS INDUSTRALES MULTIQUIM S.A. DE C.V.	Calle RIO CHUVISCAR M 9E, Colonia VALLE DORADO, C.P. 32730	N/A	N/A	N/A
Robert Bosch Sistemas Automotrices S.A. de C.V.	Parque Industrial Omega Prolongación Hermanos Escobar 6965 C.P.32310	Heritage Environmental Services	Obtainment of Raw Materials	N/A

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
RUSKIN DE MEXICO S.A DE C.V	PUERTO INDUSTRIAL, TAPIOCA Y PASEO DE LA VICTORIA 5455, INF. AMPL. AEROPUERTO. C.P. 32698	IND. NACIONAL DE LUBRICANTES	Controlled Confinement	2,800
Salter Labs de México S.A de C.V.	Parque industrial Panamericano, Calle Santos Dumont 6630,C.P.32690	Antonio Fernández Ruíz Neira (19-46-PS-I-013D-02)	Controlled Confinement	6,600
SCA NORTH AMERICAN PACKAGING DE DIVISION S.A. DE C.V.	AVE. HERMANOS ESCOBAR 2295, Colonia HIDALGO. C.P. 32300	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE.C.V.	Obtainment of Raw Materials	N/A
Sistemas Eléctricos y Conmutadores, S.A. de C.V.	Parque Industrial Antonio J. Bermudez, Ave. Antonio J. Bermúdez 1230, C.P. 32470	Pro Ambiente, S.A. de C.V.	Obtainment of Energy	N/A
INDUSTRIAS SELKIRK DE MEXICO S. DE R.L. DE C.V.	JUSTO SIERRA Y SEGUNDA AVENIDA, Colonia PORFIRIO ORNELAS. C.P.32881	RIMSA COMPANY S.A. DE C.V.	Evaporation	4,600
SERVICOS ESPECIALES DE RECOLECCION DE BASURA S.A. DE C.V.	FCO. I. MADERO 5725, Colonia LA PRESA 5725. C.P. 32688	Pro Ambiente, S.A. de C.V.	Obtainment of Energy	3,000
SHURE ELECTRONICA S.A DE C.V	PARQUE INDUSTRIAL OMEGA, AV. GUILLERMO GRIFFIN 7025PARQUE IND. OMEGA C.P.32310	CLEAN HARBORS LA PORTE LP.	Absorption	20
SIEMENS VDO S.A DE C.V	Parque industrial ANTONIO J BERMUDEZ 650 C.P. 32448	CHEMICAL RECLAMATION SERVICES	Incineration (thermal oxidation)	N/A

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
SMALL PARTS DE MEXICO S. DE R.L DE C.V.	ZONA INDUSTRIAL PASEO DE LA VICTORIA 9450, Colonia AMPLIACION INFONAVIT AEROPUERTO. C.P. 32690	PETROREFINO	Preparation of Combustible Alternative	27,800
SERVICIOS DE MANUFACTURA INTERNACIONAL S. DE R.L. DE C.V.	AV. RAMON RIVERA LARA 6325, Colonia PARTIDO IGLESIAC.P.32620	PRO-AMBIENTE SA DE CV	Preparation of Combustible Alternatives	N/A
SERVICIOS DE MANUFACTURA INTERNACIOANL S. DE R.L. DE C.V.	AV. RAMON RIVERA LARA 6425, Colonia PARTIDO IGLESIAC.P.32620	RESIDUOS INDUSTRIALES MULTIQUIM S.A. DE C.V.	Preparation of Combustible Alternatives	N/A
SOLVAY FLUOR MEXICO S.A. DE C.V.	CARRETERA PANAMERICANA KM 23.5, Colinia LAS GRANJAS	INDUSTRIA NACIONAL DE LUBRICANTES S.A. DE C.V.	Incineration (thermal oxidation)	2,600
Spectrum Control de México S.A de C.V.	Calle MANUEL J CLOUTHIER 540, Colonia ZARAGOZA C.P. 32690. C.P.32690	Gen Industrial S.A. de C.V.	Reutilization and distillation	N/A
Strattec Componentes Automotrices S.A. de C.V.	Boulevard Zaragoza 2910, Colonia Nuevo Zaragoza. C.P.32560	Mesa Oil Inc.	Reutilization	N/A
Strattec de México S.A. de C.V.	Parque Industrial Fernandez, Calle Magneto 2409, Parque Industrial Fernandez . C.P.32630	Mesa Oil Inc.	Reutilization	N/A
SYSTEM SENSOR DE MEXICO S. DE R.L. DE C.V.	Parque Industrial Gema, Calle Auxiliar 1 512, Parque Ind. Gema C.P. 32640	Rinquim Company SA de CV	Separation of Physical Filtration	N/A

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
TALLERES DIVA SA. DE C.V.	PUERTO INDUSTRIAL CD JUAREZ CHIH NAVAJOS 497 Y EJERCITO NACIONALFRACC. PASO DEL NORTE. C.P.32360	RECICOLECTO DE JUAREZ S.A. DE CV.	Controlled Confinement	800
TATUNG MEXICO SA DE CV	PARQUE INDUSTRIAL FUENTES, AV. ROSA MARIA Y DE FUENTES 7050	RESIDUOS INDUSTRIALES MULTIQUIM SA DE CV	Controlled Confinement	60
TED de Mexico S.A de C..V.	Parque Industrial Antonio J Bermudez, Av. Antonio J Bermudez 950.C.P. 32470	Chemical Reclamation Services	Controlled Confinement	N/A
TEMSA ELECTROMEX S.A. DE C.V.	COMPLEJO INDUSTRIAL LOS FUENTES, Av.VICENTE GUERRERO 7340 COMPLEJO INDUSTRIAL LOS FUENTES C.P.32320	RIMSA	Controlled Confinement	N/A
Toro Company de México S. de R.L. de C.V. Planta II	Parque Industrial Las Americas, Av. Libre Comercio 2021, Col Pque. Ind. las Americas C.P. 32596	Residuos Industriales Multiquim S.A. de C.V.	Controlled Confinement	N/A
TOSHIBA ELECTROMEX S.A DE C.V.	PARQUE INDUSTRIAL RIO BRAVO 1230, PARQ. IND. RIO BRAVO C.P. 32700	PROAMBIENTE	Incineration (thermal oxidation)	200
TOUCHE MOTORS S.A. DE C.V.	PASEO TRIUNFO DE LA REPUBLICA 6080 Colonia LOS ALAMOS C.P. 32320	RESESA	Obtainment of Energy	17,468
TRANSALTA CHIHUAHUA S. A. DE C. V.	Samalayuca D B Carretera panamericana Km 166 C.P. 32730	Jesús Ernesto Grijalva Limas	Controlled Confinement	200

Name of Oil Generator	Address	Place of Final Disposition	Type of Treatment	Volume (Liters)
TRANSPORTADORA AGRO INDUSTRIAL PEJORZA SA.DE CV	PARQUE INDUSTRIAL ZARAGOZA, AV.TECNOLOJICO 7351 Colonia NVO .HIPODROMO C.P.32690	RESESA	Controlled Confinement	N/A
COMISION FEDERAL DE ELECTRICIDAD C.TG. JUAREZ INDUSTRIAL	Calle BLVD. OSCAR FLORES L456, Colonia NUEVO HIPODROMO	RESESA	Controlled Confinement	N/A
COMISION FEDERAL DE ELECTRICIDAD C.TG. JUAREZ PARQUE	CARRETERA JUAREZ PORVENIR KM. 5.5.C.P.32470	RESESA	Controlled Confinement	11,620
UNION DE GANADEROS LECHEROS DE JUAREZ S.A. DE C.V.	AV DE LAS TORRES 2251, Col TORRES DEL SUR, C.P. 32574	RESESA	Controlled Confinement	15
VIENTEK MEXICO S. DE R.L. DE C.V.	PARQUE INDUSTRIAL OMEGA 7029 C.P.32310	ROMIC ENVIRONMENTAL TECHNOLOGIES	Incineration (thermal oxidation)	N/A
VS PRECISION S. DE R.L. DE C.V.	BAUDELIO PEREZ MUCHARRAS 420, Colonia ZARAGOZA 420 C.P.32570	N/A	N/A	74,000
YONKE FENIX S. A. DE C. V.	AV. TECNOLOGICO 7260, Col INFONAVIT TECNOLOGICO, C.P.32699	ECOLTEC S. A. DE C. V.	Recycled	1,100
			Total	**990,537. 9050**

Sources: Secretaria del Medio Ambiente y Recursos Naturales (SEMARNAT), Norma Oficial Mexicana NOM-002-SCT-2003. December, 3, 2003; and Norma Oficial Mexicana NOM-56-SEMARNAT-1993, D.O.F., July 2, 1993.